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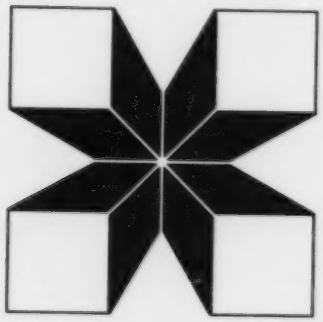

CANADA

SUSTAINABILITY OF INFORMATION SYSTEMS IN DEVELOPING COUNTRIES

AN APPRAISAL AND SUGGESTED COURSES OF ACTION

SYED SALIM AGHA

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May 1992

Sustainability of Information Systems in Developing Countries

An appraisal and suggested courses of action

by
Syed Salim Agha,
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INTERNATIONAL DEVELOPMENT RESEARCH CENTRE

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FOREWORD

In addition to supporting projects in developing countries themselves, the Information Sciences Division of the International Development Research Centre (IDRC) also promotes research on information-related issues of the day. The sustainability of information systems, particularly in developing countries, is a topic of current interest among information professionals from both North and South.

The issue is especially relevant because it highlights the predicament faced by planners/policy-makers and information professionals alike in the development of national and regional information infrastructures, namely, the lack of financial and other support to the establishment and maintenance of effective information systems and services. The low level or absence of support to this field often results from a combination of factors, including the intangibility of the benefits of information, the lack of "visibility" of information systems, and the perception that support to information systems does not yield return on investments as they do not generate much, if any, income. Furthermore, in providing for other developmental priorities (e.g., food, water, shelter, health, employment and education), allocations also need to be made to infrastructural, scientific, agricultural, industrial and commercial development. Hence, the development of national information infrastructures is often accorded low priority on national development agendas.

The following report presents the research carried out by Mr. Syed Salim Agha, Chief Librarian of the Universiti Pertanian Malaysia. Mr. Agha spent his six-month sabbatical, from April to October 1990, at IDRC to study the issue of sustainability of information systems in developing countries. A variety of methods were used in obtaining the necessary information, including a review of relevant documentation, a survey of ISD-supported projects and interviews with program staff. The resulting work presents a description of the general situation in developing countries with respect to the availability and use of information systems and services. It also provides some practical suggestions to information practitioners and others on designing and implementing, in the face of limited financial and materiel resources, sustainable information systems.

Martha B. Stone
Director
Information Sciences Division

PREFACE

Professional neglect and the lack of imagination to recognise and demonstrate the value and power of information have left information professionals behind in the process of exploiting information for effective and beneficial use. Information technology advance has been partially responsible for enhancing the value of information. Recognised as a strategic resource, information is exploited to gain competitive advantage. The private sector has recognised this faster than the public sector. Drawing from the experience of the private sector, the public sector now utilises information together with information technology to improve the planning and management of economic development and other activities.

Due to reasons related to their own respective development priorities, developing countries have not been able to pay sufficient attention to the build-up of information systems which potentially could support their development efforts. Aid agencies have tried to help in this regard by way of short-term assistance programmes to enhance the effectiveness of information systems and services. While these assistance programmes have helped to develop staff capabilities, add equipment, or experiment with new approaches, it appears that there is usually a decline in the products and services of some of these systems after aid has ceased. Out of conviction that information is an integral part of the developmental process, this study has been undertaken with two major goals in mind. First, to determine the situation information systems have been placed in, as this may account for the low level of information provision and use in the developing countries. Second, to suggest modalities that could encourage and develop sustainable information systems in developing countries with the eventual purpose of enabling greater utilisation of information to benefit society and to bolster its development. It is hoped that the results of the study would help donor agencies to understand the intricacies of information system development in the Third World countries and thereby improve the determination and the administration of aid policies and programmes. All efforts to conduct the study would have been in vain if the results are not made known to the information professionals in developing countries. Inculcating awareness of the strategy towards the development of sustainable information systems is a first necessary step. Subsequent action is dependent upon the harnessing of energies towards the realisation of the eventual goal of evolving information systems that would become more useful to their respective user communities.

This study has been made possible mainly by the approval and support received from two organisations: The Universiti Pertanian Malaysia for its approval of my sabbatical leave and the proposed programme of study; the International Development Research Centre (IDRC) for its partial support of my sabbatical leave and for the use of its office and facilities at Ottawa. I would like to express my appreciation and thanks to Tan Sri Professor Nayan bin Arifin, Vice-Chancellor, Universiti Pertanian Malaysia, Mrs. Martha Stone, Director, Information Sciences Division, IDRC, Mr. Paul Mc Connell, Deputy Director, Information Sciences Division,

Mr. Shahid Akhtar, Associate Director, Information Sciences Division, and Ms. Maria Ng, Regional Programme Officer, IDRC Singapore. Thanks are also due to the friendly and helpful staff of the IDRC and in particular the staff of the Information Sciences Division, for making my stay a pleasant one. To single out some of the staff would be at the detriment of leaving others out.

The guidance and direction of this study is largely due to the professional discourse and advice I received from friends and colleagues both in IDRC and outside, and to them I owe a debt of gratitude. Any shortcomings of the study are purely mine and I take full responsibility for them.

S.S.A.

EXECUTIVE SUMMARY

1. The study entitled 'Sustainability in Information Systems in Developing Countries' was undertaken for a period of six months.

2. The information required for the study was gathered using the following methods:

   a) Questionnaire survey
   b) A Study of the Project Completion Reports
   c) Visits to information systems in the Caribbean and North America
   d) A delphi survey
   e) Literature analysis

3. The objectives of the study were:

   a) To study the concept of sustainability as it applies to information systems and to determine its feasibility.
   b) To study ways, means and methods employed by information systems to attain sustainability.
   c) To suggest how sustainability features could be built into IDRC supported projects with the eventual purpose of enabling them to attain some form of sustainability, partial or otherwise.
   d) To suggest further areas of investigation, research and development which may shed further light on the sustainability of information systems.

4. An overview of sustainable development, is followed by an elaboration of the meaning of "sustainability", "information systems" and "information". The concept of sustainability as it applies to information systems is concerned with the maintenance and continuity of an information system over a long term enabling it to perform its functions effectively in accordance with its mandate and objectives so that it may satisfy the information needs of its user community. The concept is also a strategy in that it involves among other things the development of indigenous human capacity, a planned marketing approach as a continuous operational process, a professional awareness of unrealised potential, the need to influence government policy towards support for information systems, the need to convince management on the value and benefits of information, the necessity of generating income and the parallel development of appropriate national information policy and infrastructure.

5. The Questionnaire survey, with a 30% response rate, revealed the following:

   a) That information systems in developing countries are not well supported and consequently suffer from lack of staff, equipment and information resources.

b) That public awareness of information services offered is mainly carried out by the distribution of brochures and user education programmes. There appears no evidence that marketing concepts are used in the planning and design of information services even though suggestions to the effect have been made.

c) In view of lack of appropriate support from management many information systems have had to constantly convince management on the need to maintain existing information services. There have been responses that satisfying user needs helps in the sustenance of the service. Charges have been levied for services. There are a few who felt that if services were charged for they might end up having fewer users.

d) In response to the last few open-ended questions a wide variety of suggestions have been made with regard to useful methods for sustenance, methods that were tried and failed, general views on sustainability and whether information systems would have the potential for sustainability in their respective countries.

e) There was a qualified yes to the question whether their system could achieve sustainability. Sustainability, they responded, has a chance of being attained:

- if decision-makers understand the importance of information
- if government gives information a higher priority
- with quality services and products
- if given support and trained personnel
- given a better financial climate
- with effective management and promotion
- if the political will exists

6. The visit to the Caribbean while confirming some of the findings of the questionnaire have also revealed that:

a) Political attitudes towards information systems play a major role in the determination of allocations made to them.

b) Resource sharing and co-operation in the use of information resources is well practiced in the region.

c) Problems of human resources development were evident. The need to infuse technical, analytical and repackaging skills in professional staff has been urged.

d) There was some apprehension in response to the problem of sustainability of information in view of factors beyond their control.

e) Marketing, promotion and evaluation of services is seldom undertaken due to limited resources.

f) It was felt that if there was a better understanding of how information adds value and is therefore useful then it would be easier to convince authorities concerned to provide necessary support for information systems.

7. The visit to information systems in North America focused on learning more about income generation, marketing and promotion of services and the effective use of information technology. The following observations have been made:

a) Income generation is normally the responsibility of a specially formulated unit. The amount of income generated is sufficient to cover the expenses incurred by the unit including staff salaries of those operating the unit.

b) It is clear that information systems in most cases would be unable to generate enough income to support the entire organization. Some services operated by the system could be run along commercial lines.

c) The professional application of marketing methods was not evident in the systems visited. The approach to marketing information was casual and evolutionary indicating definite directions towards the development of appropriate methodologies in information marketing. Problems of how to determine the market and start-up costs of fee-based services have been recorded.

d) The intelligent use of the evergrowing power and use of the microcomputer promises to be the wave of the future. The storage of databases and text files on optical discs are entering an exciting stage. Coupled with the microcomputer and electronic communication the promise of cheaper and faster document delivery remains bright.

8. A delphi survey, using IDRC/ISD programme staff as experts, was carried out to arrive at a consensus on:

a) Problems faced by information systems in developing countries.
b) The criteria necessary for the attainment of sustainability.
c) Pre-conditions for sustainability.

9. The consensus on problems faced by information systems in developing countries in order of priority were:

- Budgetary problems
- Planning and management of information systems
- Interaction with users
- Human resource development
- Marketing and promotion of services
- Staff allocations and relative status
- Stability of parent organizations
- National infrastructure
- Access to publications

Problems which have the highest impact and about which something can be done are:

- Planning and management of information systems;

- Interaction with users;
- Marketing and promotion of services;
- Management attitudes.

10. The consensus on the criteria for sustainability in order of priority were:

- Support from parent organizations;
- Knowledge of users and information uses;
- Good management practice;
- Promotion and marketing of services;
- Optimum use of local resources;
- Generation of income;
- Human resource development.

The assessment of the criteria which had a high impact and which were relatively easy to incorporate in an IDRC/ISD project or an information system were:

- Support from parent organization;
- Good management practice;
- Knowledge of users and information uses;
- Promotion and marketing of services.

11. The consensus on pre-conditions for sustainability in order of priority were:

- Good financial support;
- Sound marketing of information services;
- Management awareness of importance of information;
- Stable institutions;
- Clear mandate;
- Adequate staff;
- Support and co-operation, national and international;
- Tailor information to expressed needs.

12. It is the finding of the study, in accordance with the hypothesis that was used at the beginning of the study, that inspite of the situations in which information systems in developing countries are placed, possibilities exist for them to evolve over a period of time to put into place features that will enable them to achieve sustainability, partially or otherwise.

13. It must be added, however, that to achieve sustainability the following factors should be addressed satisfactorily:

a) That government policy be influenced positively towards support for information systems.

b) That attempts be made using a variety of methods and techniques to convince management on the value and benefits of information and its management.

c) That management exercise its option for a management audit of information systems to ensure that they specify their requirements and that information systems are responding accordingly.

d) That there be a pronounced user orientation in the planning and design of products and services reflecting a response to user needs. There must be a constant interaction with the users to constantly monitor their needs and to demonstrate to them time and again the usefulness of information.

e) That attempts must be made to market and promote information services and products to create awareness and encourage a greater use of services and products.

f) That there must be the practice of good management for the efficient and effective operation of the system.

g) That there should be in place, where opportunities exist for participation in Resource Sharing Programmes and Co-operative Schemes.

h) That the training development and continuing education of information professionals be a continual process incorporating the need to enhance new skills and in particular the ability for information analysis, information repackaging and the application of information technologies.

i) That serious attempts be made to build, develop and manage co-operatively or otherwise, a database of local and or national information.

j) That there be developed through professional bodies and other mechanisms, the development of positive attitudes leading to self-reliance, confidence building and high levels of professionalism.

k) That there be effective use of information technology through the judicious choice of an appropriate mix of technologies suited to the local environment.

14. The achievement of sustainability has better chances of success if all or most of the above factors are acted upon in concert.

15. Caution is exercised in the use of sustainability as a criteria for the choice of a potential project for IDRC/ISD support.

16. It is suggested that IDRC/ISD projects be classified as:

a) Those which satisfy some of the criteria and pre-conditions for sustainability and therefore are on the road towards the attainment of sustainability.

b) Those which satisfy one or so criteria for sustainability signifying that there is promise in the attainment of sustainability over a period of time if attention is paid to the development of other criteria.

c) Those which do not satisfy any criteria for sustainability. Aid that is administered should be aimed at development that would eventually satisfy some of the criteria for sustainability.

17. It is suggested that the development of the following tools will aid in determining the potential of projects in the attainment of sustainability:

a) A database of the status of the information world in each country where IDRC/ISD has projects.
b) A checklist outlining the criteria for sustainability.
c) A checklist of indicators of sustainability.

18. It is suggested that attempts be made to incorporate sustainability features at the following project phases with appropriate budgetary support being made available at the pre-project phase.

a) At the pre-project phase.
b) At the project phase.
c) At the post-project phase.

19. Suggestions have been made in specifying certain roles that programme officers can play to indirectly influence the achievement of sustainability.

20. The development of information systems leading towards sustainable development should be viewed as a multi-layered development with each phase shading into the next. Awareness of what should be done to achieve sustainability is the first step. Subsequent developments will depend upon a definite course of action being taken simultaneously or on a phased basis on all fronts. It is only with time and targetted action that sustainable development of information systems in developing countries will be a reality.

21. Suggestions have been made on further areas of research and study that need to be undertaken to enable a better understanding of the factors that can help in the achievement of sustainability of information systems in developing countries.

INTRODUCTION

Background

1. This report is the result of a study undertaken between April and October 1990. The purpose of the study was to look into aspects of sustainability of information systems in developing countries. The issue of sustainability has gained prominence due to various developments. Ainalem Tebeje,[1] in her review of Project Completion Reports of the Information Sciences Division (IDRC/ISD) of the International Development Research Centre (IDRC), singled out sustainability of IDRC/ISD projects as one of the three priority issues for an in-depth study and identified it as an area of major concern. Another study[2] conducted by IDRC identified "funding and sustaining services and systems" as one of the major spheres of action that the IDRC/ISD expects to take. Concern has been expressed on the lack of appropriate information infrastructural development in the poorer countries of the world[3]. A further concern is that existing information systems in these countries are generally not very well supported and, as a consequence, do not contribute sufficiently to the process of development[4],[5].

2. There is widespread recognition today that information is a major developmental resource. What is not generally recognized is that information can accelerate and reinforce the development of other major resources: human, natural and financial. It has been predicted that knowledge would replace capital as society's most important resource. It follows therefore that information systems should not only be adequately supported but must also respond appropriately to user expectations and needs to ensure the utilization of information for maximum benefit. Based on the above and other observations of information systems in developing countries, it was felt necessary to conduct this study with a view to ascertaining factors considered important to the question of their sustainability. The study was conducted at the Information Sciences Division of the IDRC as it is the only

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1 Ainalem Tebeje. Review of Project Completion Reports and Proposals for a PCR database, Ottawa, IDRC: 1988.

2 Sharing knowledge for development: IDRC's information strategy for Africa. (Technical Study 64e, f) Ottawa, IDRC: 1989.

3 Shawky Salem. Guest editorial. Journal of Information Science. 14 : 129-130, 1988.

4 B. K. Eres. Socio-economic conditions related to information activity in less developed countries. Journal of the American Society for Information Science. May 1985. pg. 213-219.

5 James, Heitzman. Information systems and development in the third world. Information Processing and Management. 26(4) : 489-502, 1990.

organisation that has a very active programme desgined to support information systems. This is complemented further by the good documentation it posseses on projects supporting information systems throughout the world and in particular the developing countries.

Objectives of the study

3. The objectives of the study are:

a) To study the concept of sustainability as it applies to information systems and to determine its feasibility.
b) To study ways, means and methods employed by information systems to attain sustainability.
c) To suggest how sustainability features could be built into IDRC supported projects with the eventual purpose of enabling them to attain some form of sustainability, partial or otherwise.
d) To suggest further areas of investigation, research and development which may shed further light on the sustainability of information systems.

Methodology

4. Over a period of six months pertinent information relevant to the topic was gathered by using the following methods:

a) The administration of a questionnaire to existing and ceased IDRC/ISD projects located around the globe.
b) A study of Project Completion Reports (PCRs) of IDRC/ISD held at IDRC in Ottawa.
c) Visit and study information systems in developed and developing situations.
d) The conduct of a delphi survey on the topic.
e) The analysis of literature relating to sustainability and the exploration of key concepts that could be applied to information systems to enhance their potential for sustainability.

SUSTAINABLE DEVELOPMENT

5. The alarming rate of natural resources depletion with its resultant environmental effects has over time led to the development of the concepts of sustainable development. It was Hotelling[6] in 1931 who laid the ground work for the development of the concept with his benchmark study on exhaustible resources. It was only later that the concept was developed by the International Union for Conservation of Nature and Natural Resources when it published its World Conservation Strategy in the early eighties. It was, however, the "Brundtland Commission" or the World Commission on Environment and Development

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[6] Hotelling. The economics of exhaustible resources. Journal of Political economy. 39 : 137-175, 1931.

that "invested in the concept with a renewed sense of relevance and urgency."[7] This meaningful concept has become a buzzword not just in the fields of environment and development but is also being applied to other fields such as agriculture, industrialization, water supply and sanitation, women's studies, etc. The concept has emerged on the agendas of national and international bodies. Aid agencies are beginning to use the concept as a basis for future aid programmes. The inter-disciplinary nature of sustainable development has led to the concept being defined in many ways. The Bruntland Commission has defined it as

> "paths of human progress which meet the needs and aspirations of the present generation without compromising the ability of the future generations to meet their needs".

As it is a strategy to enhance global security it is an attempt to integrate economic development and the protection of the environment into a single science rather than the separate challenges that they are today. Judging from the application and use of the concept in other fields there is a general tendency in recent literature to emphasise the need to conserve the environment and how this need relates to the field concerned. In most cases there is a heightened awareness of the depletion of natural resources and what individuals and groups should do to stem the tide.

6. Its application differs in the area of water supply and sanitation. A WHO consultation[8] on the subject reflected "a common concern that cost recovery instruments should generate cash resources of amounts required to cover cash expenditures. Liquidity maintenance and continuity of the service were regarded as essential, hence the definition of 'the shoe-box principle': nothing can come out of a shoe box unless something is put into it first. The guiding principles for cost recovery include ensuring optimum efficiency; focus on cost control; optimum utilization of facilities and good consultation with customers. Drawing from the notes of a discussion on sustainability held at a forum at the UNDP Asia and the Pacific Programme for Development Training and Community Planning in July 1990, it was summarised that the concept of sustainability for rural community projects should incorporate the following features.

a) From the financial perspective

   i) What is done must be affordable

   ii) There should be profitability

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7 Warren Lindner, Guest Editor. Development. 1989: 2/3, p. 3.

8 Cost Recovery in Community Water Supply and Sanitation. Report of the Fourth Consultation on Institutional Development. WHO, Geneva, 21-25 November, 1989. Geneva, WHO: 1989.

iii) There must be economic viability

b) From the environmental perspective

i) Thought must be given to sustainability before the start of the project.

ii) That projects or institution should contribute to society.

iii) That what the project or institution does is more important than the concern that it should merely exist.

c) From the social standpoint

i) Change of attitude of Government or management that the target audience should be considered as partners and or as service definers.

ii) That training programmes for rural communities incorporate the concept of group sustenance and cohesiveness.

iii) That the capacity to continue with a process should be invested in the people.

iv) That there be people participation.

v) That beneficiaries contribute to costs in kind or with funds.

7. The concept of sustainable development or sustainability has to be viewed differently and be suited to the area of application. The information environment is not concerned with the depletion of natural resources. It is concerned among other things with the selection, acquisition, storage, analysis, synthesis, consolidation, dissemination and transfer of data and information such that the range of activities, products and services that are derived or developed are beneficial to specific target groups. The concept of sustainability therefore has to be applied to information systems in the context of its suitability to the information industry. The concern is not so much the sustainability of information but of the information system that manages it.

Sustainability and information systems

8. Information management is faced with new challenges as it prepares to cope with a dynamic and fast-changing environment. The indefinite variety of demands, interactions and responses that information systems are subjected to, signals the need for an appropriate strategy to survive against other competing services. The concept of sustainability as it applies to information systems will have to be uniquely adapted to suit the complex and yet under-explored field of information sciences.

9. The concept of sustainability as it is applied to information systems should be concerned with the maintenance and continuity of an information system over a long term, enabling it to perform its functions effectively in accordance with its mandate and objectives so that it may satisfy the information needs of its user community. The concept is also a strategy in that it involves among other things the development of indigenous human capacity, a planned marketing approach as a continuous operational process, a professional awareness of unrealised potential, the need to influence government policy towards support for information systems, the need to convince management on the value and benefits of information, the necessity of generating income and the parallel development of appropriate national information policy and infrastructure. It must be understood that sustainability is not just concerned with the problem of continuity. Together with appropriate levels of maintenance of an information system, there must be an adequate response by the system to justify the reason for its existence -- to satisfy the needs of its users. This can only be done if it performs its functions effectively. The accent of continuity on a long term implies that there is a need for the system. There must be the logical assumption that an information system should either cease to exist or adapt itself to its changing environment if there are clear indications that it is not serving its purpose.

10. In the context of this study an information system is an operation which is established to meet the information needs of a community of users, involving a coherent series of formally-designed, "value-added" processes to achieve its objectives. Examples of an information system include a specialised information centre, a special library, a mass media facility (such as journal or periodical publishing), an information analysis centre, a referral service, and information re-packaging unit, and an extension or advisory service. This implies that the results of the study could be applied to all information systems, keeping in mind the size of the operation of the system and the need to make adjustments.

11. Information is used every day in its complex variety by people in all walks of life. The seeming omnipotence of information and its pervasive quality make defining it almost impossible. And yet some parameters will have to be defined. From a management point of view, information has been described as "data endowed with purpose"[9]. In a report by the United Nations Economic Commission for Africa on National Information and Informatics Policies for Africa, the domain of information was described[10] as:

> "intelligence of knowledge that contributes to the social, economic and cultural well-being of society irrespective of the form it is encrypted in (text, figures, diagrams, etc); irrespective of the medium it is stored in (paper, magnetic etc.); irrespective of the mode of dissemination (oral, written or audio-visual, etc) and the social activity that gives rise to it (research, administration, censuses, remote sensing, etc.) and the institutions that

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9 From the notes of a conversation with Dr Jeffery Dellimore, Caribbean Development Bank, Barbados in 1990.

10 Dejen Abate. "Issues pertaianing to national information and informatics policies in Africa". In : Report of the Regional Seminar on National Information and Informatics Policies in Africa. Ottawa, IDRC, 1990.

organize and disseminate it (libraries, documentation centres, archives, statistical offices, mapping agencies, geological surveys, computer centres, media and broadcasting services, telecommunication services)."

For the purposes of this study, information is conceived as data which is perceived to be useful by a user at a point in time. Usefulness may be interpreted as having reduced uncertainty, helped to resolve a problem, aided in a decision-making process, or has enhanced the value judgement on an issue concerned.

QUESTIONNAIRE SURVEY

12. It was thought necessary that a study of the sustainability of information systems in developing countries would need basic data on the status of such systems. The best way, under the circumstances, to collect such data was to administer a questionnaire to all active and closed ISD projects. A questionnaire (Appendix A) was formulated, going through several drafts and pilot testing. The questionnaire was sent to 454 organizations around the globe.

The purpose of the questionnaire specifically was

a) to collect basic background information on information systems in developing countries
b) to determine basic problems faced by information systems especially in developing countries
c) to learn of methods they have used to overcome their problems
d) to get their views on sustainability as it relates to their organizations and in general.

The results of the questionnaire are given below.

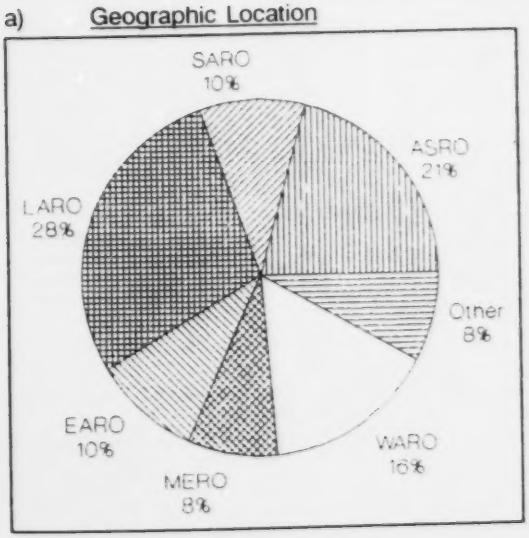
Questionnaire Response

13. Out of a total of 454 questionnaires sent, 135 were returned giving a response rate of 30%. A greater response rate was expected considering that all the projects were IDRC-supported ones. In all probability, a greater response would have been achieved given more time. Regardless, the percentage of responses is sufficient to give a representative picture of the real situation.

14. Nature and Location of the Information System

Question 1

a) Geographic Location



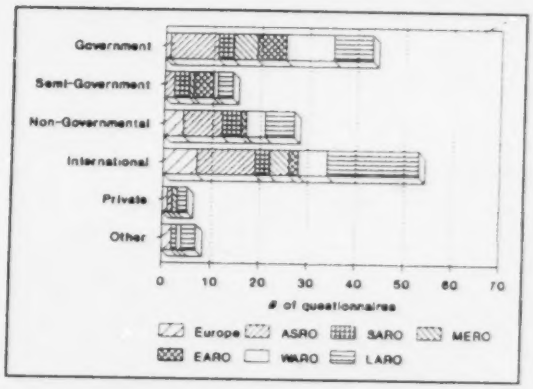
Numbers of questionnaires returned:

ASRO	28
EARO	13
LARO	38
MERO	11
SARO	13
WARO	21
Other	11
TOTAL	**135**

b) Type of Organization

Figures indicate the response in terms of the percent of returned questionnaires; sometimes more than one type was indicated.

	ASRO	EARO	LARO	MERO	SARO	WARO	OTHER	TOTAL
Government	36	46	21	45	23	48	9	32
Semi-Government	7	31	8	9	23	5	0	10
Non-Government	29	8	16	0	31	19	36	20
International	43	15	50	36	23	29	64	39
Private	4	0	5	9	0	0	9	4
Other	0	0	8	0	8	5	18	5

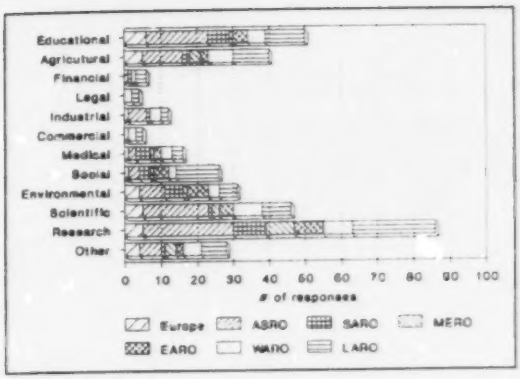


As 39% of the responses were from international organizations, it may be construed that the results may not truly represent conditions in developing countries. This is based on the assumption that information systems in international organizations are generally well-supported. Despite this considering that 32% of the responses were from government organizations and 20% were from non-governmental organizations (NGOs), the results may not have been skewed to the extent of portraying a false representation of the real situation.

c) Nature of Organization

Figures indicate the response in terms of the percent of returned questionnaires; often more than one category was indicated.

	ASRO	EARO	LARO	MERO	SARO	WARO	OTHER	TOTAL
Educational	61	31	29	9	46	24	55	37
Agricultural	39	15	26	27	15	33	45	30
Financial	4	0	8	0	8	5	0	4
Legal	0	0	5	0	0	10	0	3
Industrial	18	0	5	0	8	14	9	9
Commercial	0	0	5	0	0	10	9	4
Medical/Health	7	15	8	9	31	14	9	12
Social	11	31	32	9	23	10	9	19
Environmental	25	46	13	9	38	14	36	23
Scientific	64	31	21	18	8	38	45	34
Research	89	62	61	73	69	38	45	64
Other	21	15	18	27	8	24	36	21

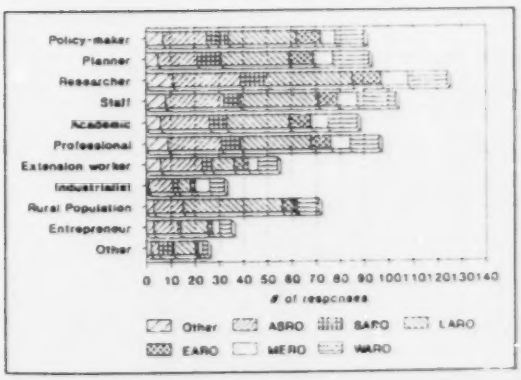


The responding organizations were well spread out in terms of their field coverage. Greater response was received from research, educational, scientific and agricultural organizations.

d) Types of Users Served

Figures indicate the response in terms of the percent of returned questionnaires. Often, several types were indicated.

	ASRO	EARO	LARO	MERO	SARO	WARO	OTHER	TOTAL
Policy-makers	64	77	74	55	69	57	64	67
Planners	57	77	74	73	77	71	45	68
Researchers	100	92	92	100	85	76	100	92
Students	86	62	84	73	54	76	73	76
Academic Staff	71	69	68	64	54	57	55	64
Professionals	79	62	76	73	62	57	82	71
Extension workers	61	46	24	36	31	38	55	40
Industrialists	36	15	13	55	15	29	9	24
Rural Populations	43	38	11	9	0	43	27	25
Entrepreneurs	36	15	29	27	8	24	27	26
Others	11	8	24	18	46	10	18	19



There was a good mix of the types of users that were served by the responding organizations. Researchers led the way with 92% of the total followed by students (76%), professionals (71%), planners (68%), policy-makers (67%) and academics (64%).

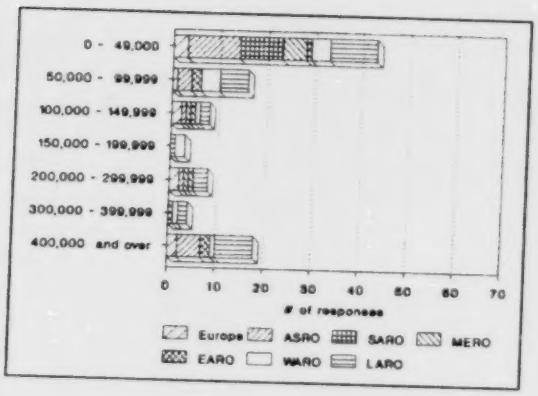
15. Financial Allocations

Question 2

"What is the total financial allocation inclusive of staff salaries, made to your information system this year?"

Figures indicate the number of responses in each category. This question was sometimes left blank.

	ASRO	EARO	LARO	MERO	SARO	WARO	OTHER	TOTAL
0 - 49,000	11	1	10	5	9	4	3	43
50,000 - 99,999	3	2	6	0	0	4	1	16
100,000 - 149,999	1	1	2	1	0	1	2	8
150,000 - 199,999	0	0	0	0	1	2	0	3
200,000 - 299,999	1	1	3	1	0	0	2	8
300,000 - 399,999	0	1	2	0	0	1	0	4
400,000 and over	5	2	8	0	0	1	2	18



A majority of the information systems had budgets below US 50,000 a year inclusive of staff salaries. This definitely paints a gloomy picture. The acquisition of information (books, journals, photocopies, on-line services, etc.) would be minimal. This is by far a major problem.

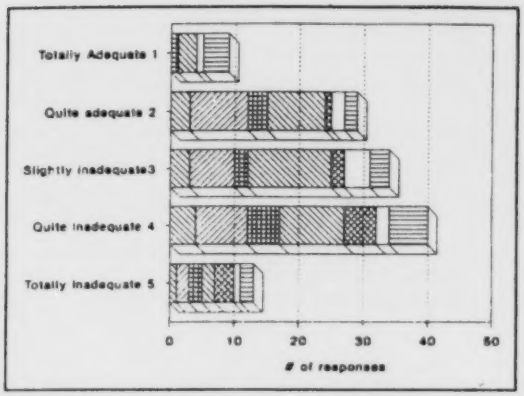
16. Rating of Financial Allocation

Question 3

"How do you rate the allocation in terms of enabling you to achieve the objectives of your information system? Circle appropriate rating from 1 (adequate) to 5 (inadequate)."

Figures indicate the response in terms of the percent of returned questionnaires. This was sometimes left blank.

	ASRO	EARO	LARO	MERO	SARO	WARO	OTHER	TOTAL
Adequate 1	0	0	8	9	8	19	0	7
Quite Adequate 2	32	8	24	18	23	10	27	21
Slightly Inadequate 3	25	15	34	36	15	14	27	25
Quite Inadequate 4	29	38	26	18	38	29	36	30
Totally Inadequate 5	7	23	5	9	15	10	9	10



This response shows clearly that most of them felt that their budgets were inadequate. The large number of international organizations that responded has probably led to responses indicating adequacy of the allocations.

17. **Staff Positions Available**

Question 4

"How many staff positions do you have at present?"

Figures indicate the number of responses in each category. This was sometimes left blank.

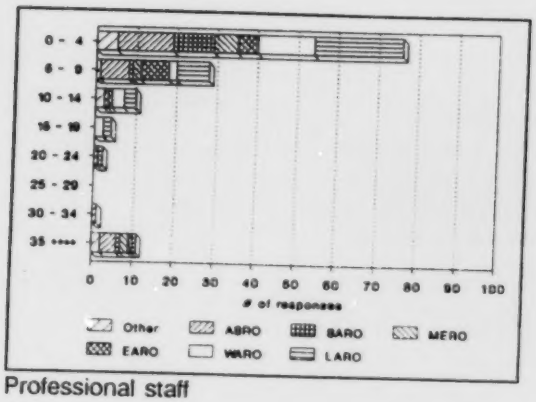
a) professional staff

	ASRO	EARO	LARO	MERO	SARO	WARO	OTHER	TOTAL
0 - 4	14	5	22	6	10	14	5	81
5 - 9	7	7	8	2	1	2	1	28
10 - 14	1	0	3	1	0	3	2	10
15 - 19	0	0	2	0	0	2	0	4
20 - 24	1	0	1	0	0	0	0	2
25 - 29	0	0	0	0	0	0	0	0
30 - 34	1	0	0	0	0	0	0	1
35 -	4	1	1	2	1	0	2	11

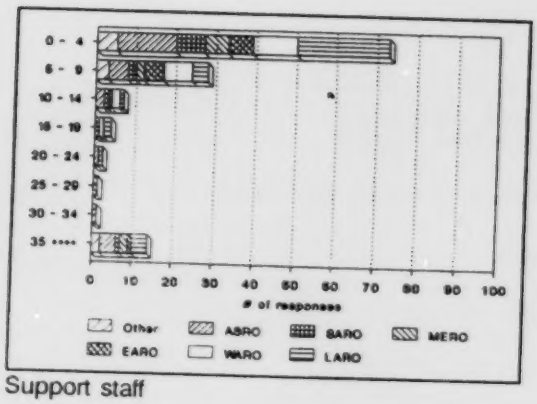
b) support staff

	ASRO	EARO	LARO	MERO	SARO	WARO	OTHER	TOTAL
0 - 4	15	6	23	6	7	11	5	73
5 - 9	5	5	4	2	2	7	3	28
10 - 14	2	1	1	0	1	2	0	7
15 - 19	0	0	2	0	1	1	0	4
20 - 24	1	0	1	0	0	0	0	2
25 - 29	0	0	0	1	0	0	0	1
30 - 34	1	0	0	0	0	0	0	1
35 -	4	1	4	2	1	0	2	14

Majority response indicated that the number of staff positions were low. Of course, this has to be evaluated relatively to the size of the operation and other factors. Regardless, it can be surmised that the small number of staff limits the range of activities that they can perform. The professional staff to support staff ratio is rather high indicating that professional staff probably end up carrying out clerical and associated tasks thereby not maximizing their professional abilities.



Professional staff



Support staff

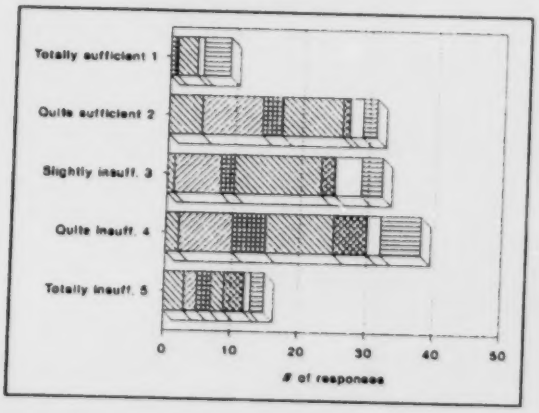
18. Rating of Staff Positions

Question 5

"Are the positions sufficient to carry out the major functions of your information system? Circle appropriate number - on a scale of 1 (sufficient) to 5 (insufficient). Figures represent the percent of returned questionnaires."

Figures indicate the response in terms of the percent of returned questionnaires. This was sometimes left blank.

	ASRO	EARO	LARO	MERO	SARO	WARO	OTHER	TOTAL
Sufficient 1	14	0	5	18	8	10	0	8
Quite Sufficient 2	32	15	29	18	31	19	45	27
Slightly Insufficient 3	25	23	24	36	23	29	9	24
Quite Insufficient 4	25	46	29	18	31	19	18	27
Totally Insufficient 5	4	8	8	9	8	24	27	11



It seems quite clear that 62% view staff allocations made to them as insufficient.

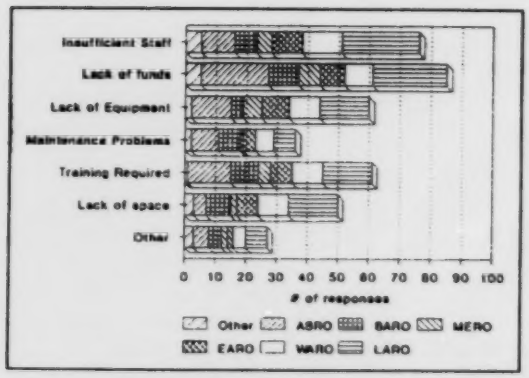
19. Problems Encountered

Question 6

"What problems do you face in the production and development of your current products and services? Please tick one or more, as applicable."

Figures indicate the response in terms of the percent of returned questionnaires. Often, more than one problem was indicated.

	ASRO	EARO	LARO	MERO	SARO	WARO	OTHER	TOTAL
Insufficient staff	39	77	66	45	54	62	45	56
Lack of funds	79	62	63	64	77	43	45	63
Lack of equipment	46	69	42	55	31	48	18	44
Maintenance problems	32	31	18	9	54	29	18	27
Training required	50	54	42	36	69	48	9	45
Lack of space	14	54	42	18	62	48	27	37
Others	18	15	18	18	31	19	27	20



Lack of financial support was a major problem encountered by more than 60% of the respondents. This was followed in order of prominence by insufficient staff, lack of equipment and the need for staff to be trained.

Other problems identified by the respondents apart from lack of space and equipment maintenance problems are:

unfilled vacancies
insufficient management support
rapid staff turnover
foreign exchange problems
equipment obsolescence
low staff salaries
difficulties in recruiting staff

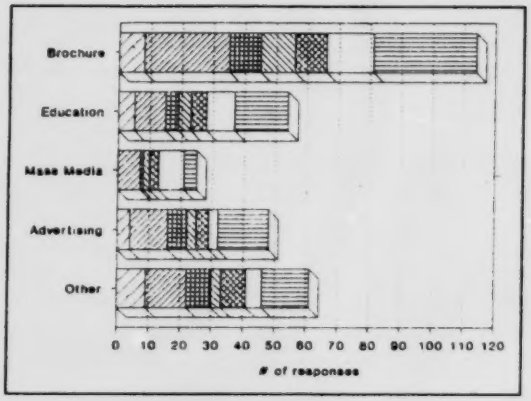
20. Promotional Methods Used

Question 7

"What measures are used for the promotion of your system and its resources?"

Figures indicate the response in terms of the percent of returned questionnaires. Often, more than one method was indicated.

	ASRO	EARO	LARO	MERO	SARO	WARO	OTHER	TOTAL
printed brochures	96	77	87	100	77	71	73	84
user education	36	38	45	36	31	43	45	40
use of mass media	25	23	11	18	8	38	0	19
advertisements	43	31	42	27	46	14	36	36
others	46	62	39	27	62	24	82	45



Printed brochures were used by 84% of the respondents to promote the system and its resources. This was followed by user education programmes and advertising.

Other methods reported include the following -

demonstrations at expositions, conferences, etc.
printing of posters
speaking at meetings
briefing sessions
E-mail announcements

21. Problems Faced in Sustaining Information Systems

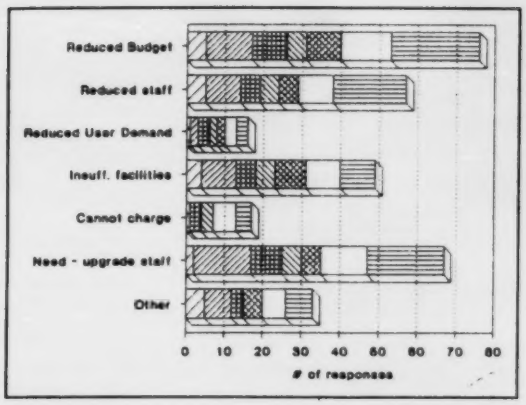
Question 8

"The concept of sustainability is concerned with maintenance and continuity of an information system so that it may satisfy the information needs of its users. In this connection, what are the problems you face in sustaining your information system, if any? Please tick one or more, as applicable."

Figures indicate the response in terms of the percent of returned questionnaires. Often, more than one problem was indicated.

	ASRO	EARO	LARO	MERO	SARO	WARO	OTHER	TOTAL
Reduced budget	43	69	61	45	69	62	45	56
Reduced staff support	32	38	50	45	38	43	45	42
Reduced user demand for services	7	15	8	18	23	14	9	12
Insufficient facilities	32	62	24	45	38	43	36	36
Not permitted to charge for services	0	0	11	27	23	29	9	13
Need to upgrade staff capabilities	54	38	53	45	62	57	18	50
Other	25	38	18	0	23	29	45	24

The response to this question tallies somewhat with the response to question 6 in that they face problems in getting adequate budgetary support. The next problem in order of prominence was on the need to upgrade staff capabilities. This response is not consistent with the answer to question 6 where lack of staff took second place. Regardless, reduced staff support and the inadequacy of



the facilities figure high in the responses received.

Other responses indicated by the respondents are -

- management outlook and priorities
- users can't or won't pay for services
- lack of recognition by parent organization
- lack of purpose
- devaluation of currency

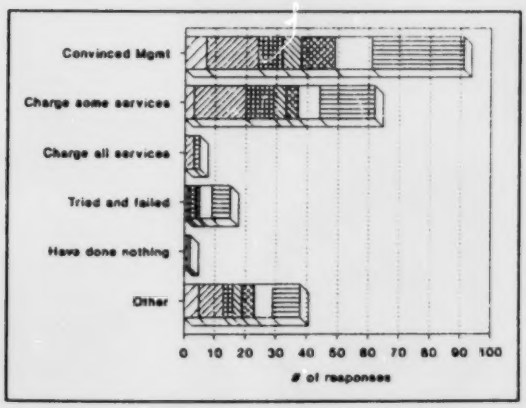
22. Methods of Overcoming Problems

Question 9

"How have you overcome your problems of sustaining your information system?"

Figures indicate the response in terms of the percent of returned questionnaires. Often more than one method was indicated.

	ASRO	EARO	LARO	MERO	SARO	WARO	OTHER	TOTAL
Have convinced management on the need for continued support	61	85	79	55	62	57	64	67
Have charged for some services	61	31	47	36	69	33	27	46
Have charged for all services	11	0	5	0	0	0	0	4
Have tried some approaches but failed	4	0	16	9	15	19	9	11
Have done nothing	0	0	0	0	0	5	9	1
Other	29	31	24	27	23	29	45	28



67% of the respondents have tried to convince management on the need for information services. Others have tried to generate income by charging for some or all of their services. Some of the other means of overcoming problems used by the respondents are

- tried to have joint ventures with other organizations
- tried to get international grants or external funding
- scaled back their activities
- charged membership fees
- sold publications
- tried networking and resource sharing

23. Useful Methods Tried to Sustain System

Question 10

"Please list methods, ways and means that have been found to be useful to sustain your information system."

The response to this open-ended question was as follows:

memberships	respond to user needs	targeted promotion
grants	enhancing goodwill	voluntary service
upgrade staff	reduce expenses	improve services
networking	feedback from users	market services
use of information technology	promotion of products	satisfy user needs
	motivate staff	charge for services
offer relevant and efficient services	develop marketing approach to information services	increase user awareness and interest

24. Income Generation

Question 11

"In your situation, would you be able to generate some income from your products and services?"

76% of the respondents indicated that they can generate income. This was accompanied by notes on how they would be able to implement their income generation plans. Charging for some services or all services was common. A system of preferential charges for various groupings was suggested. The sale of publications and other audio-visual products was also suggested. Use of memberships as additional sources of income, and fees for training courses have been put forward.

Those who replied in the negative stated that they were either not allowed to charge for services or felt that the effort was not worth it since the income was added to the coffers of the parent body. A few felt that information services should not be charged for.

25. Failed approaches

Question 12

Please list approaches that have failed in your efforts to achieve sustainability.

The response to this open ended question included the following:

Appointing distribution agents for publications.
Persuading staff to use computers.
With present government nothing works.
Paid membership got few responses.
Raising endowment funds.
Tried to get users to pay for services.
Trying to sell subscriptions.
Seeking external funding for capital improvement.

Other responses made indicated that the respondents either did not understand the question well or were confused between the last few questions asked.

26. Feasibility of attaining sustainability

Question 13

In your opinion, is it feasible for information systems in your country to attain sustainability?

87% of the respondents gave a qualified YES which included a lot of IFs. Among them were:

- if decision-makers understand importance of information
- if government gives information a higher priority
- with quality services and products
- if given support and trained personnel
- given a better financial climate
- with effective management and promotion
- not possible in government bodies.
- if the political will exists

Those who replied in the negative responded by stating that:

- the problems they currently face are overwhelming
- that users are not willing to pay for services
- value of information is not recognized
- little importance is given to information

27. Pre-conditions for sustainability

Question 14

What do you think are the basic pre-conditions or requirements necessary to achieve sustainability in your situation?

This open ended question had the following responses:

senior management support	long-term strategy
respond to user needs	provide worthwhile and up-to-date information
more financial support	qualified personnel
business-minded staff	good infrastructure
products that serve real user needs	vigorous promotions
political will	delivering goods quickly
good user orientation	satisfy user needs
user needs studies	recognize value of information

28. Comments on sustainability

Question 15

Please make any other suggestions or comments relevant to the topic of sustainability of information systems, including examples of systems or methods you know are successful in attaining sustainability.

Among the comments made are:

Too unstable in Africa.
Could only proceed gradually.
Difficult to get all factors together.
Collection development not possible without funds.
Develop and strengthen South-South cooperation.
Sustainability should be evaluated on a permanent/ongoing basis.
Must fulfil real user needs, and adapt to users.
Identify markets and products.
Prioritize according to capability.
Use of information must be stimulated.
Cost-effective repackaging of information.
Methods to attain sustainability should be donor supported.

SUMMARY OF VISITS

29. Visits were made to the Caribbean and some selected information systems in North America. Each of the visits had separate objectives but in both cases it was felt necessary to get feedback from those working on the ground. Summarized below are the findings of each visit.

Visit to the Caribbean

30. The purpose of the visit to the Caribbean was:

a) To study and observe the real situation on the ground.
b) To get feedback from information professionals on their view of sustainability.
c) To get a feel for the potential of achievement of sustainability of information systems in the Caribbean exemplifying a developing country perspective.

A list of persons and places visited is given in Appendix II.

31. The interaction with all the information professionals was to get their views and feedback on the following:

a) Problems faced by information systems in developing countries.
b) To identify criteria that would be necessary to achieve sustainability.
c) To know of useful methods used by them to aid the process of sustainability.
d) To identify pre-conditions that must be in place for sustainability to become a reality.

32. The findings of the visit to the Caribbean are summarized in the following. Some of the findings are views of individuals and others are shared by most of the persons visited.

a) Political attitudes towards information systems play a major role in the determination of allocations made to them. Professionals from one country (best left unnamed) compared allocations to information agencies and the importance attached to them between successive governments in the country. One was favourable while another was not so.
b) When the political climate is favourable towards information systems, the information professionals should make use of every opportunity to influence government on the need to give better support for information facitities. This is all the more possible if information professionals are placed in situations where they could play a key role in guiding and advising government and implementing the development of the national information infrastructure. Such persons should be above institutional affiliations. They should be guided by a high level of professionalism and patriotic flavour to develop information systems for the good of the country. This was definitely found to be so in Jamaica. The information professionals in that

country have been successful in getting together to put forward a whole chapter on development aid that should be accorded to the information sector as part of the country's recent five year development plan. Such a trend augers well for information infrastructural development.

c) Despite favourable political attitudes, budgetary allocations made to information systems might still be insufficient in view of the limited size of the economy. This leaves a situation where information systems sometimes resort to tapping external funding sources. There is the local feeling that such sources of funding are particularly useful in the upgrading of staff capabilities, the purchase of equipment or the development of new services or ideas for implementation. This is where donor agencies can play a useful supplementary role in developing information systems.

d) In view of the limited resources at their disposal there is a realization that they should make the best use of what they have. This realization extends to the need for greater cooperation with other information systems in the country, the need for sharing of resources and for networking and other forms of linkage.

e) It was expressed quite unanimously that national planning of information systems and services paves the way for better support to information systems and to put other supporting infrastructural development into place.

f) It was generally felt that cooperation and networking be based on an informal and loose structure as this allows for flexibility.

g) The need to enhance technical skills was emphasized. There was obviously a lack of appropriate training facilities to develop the technical skills required particularly in the use of information technology. It was at the National Library of Jamaica during a discussion with senior staff that this matter was highlighted.

h) One institution felt that the use of MINISIS[11] for databases has been very useful. However, the financial burden on institutions and in particular libraries would be relieved if MINISIS could be used both for database application and to serve as an integrated library system. The proposed development of MINISIS so that it need not be machine dependent, as it is now, was welcome with the wish that the process be hastened. Moves have been made to establish MINISIS Resource Centres in the hope that the dependency on IDRC to maintain and train in the use of the software would be reduced. The sustainability of these centres would be enhanced if they were to market the system in the country or region (free to government institutions), offer training, consultancy and other services on a charge basis. In the end it is the enthusiasm, perseverance and services that the centre offers that will determine its success and sustainability.

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11 MINISIS is a database management software developed by IDRC and distributed free to developing countries. It is machine dependent and runs on a minicomputer.

i) Microcomputers are being used by many information systems together with micro CDS/ISIS[12].

j) Most of those interviewed generally agreed on the need to strive towards the attainment of sustainability. All were in agreement that it would be possible to generate some income depending on various factors. However, there was some apprehension as to whether they would be able to achieve sustainability particularly because of factors beyond their realm of control.

k) All those interviewed acknowledged that:

   i) The design of products and services are more traditional in nature based either on assumed user needs or generally directed to users in the hope that they would be useful.

   ii) No serious attempts are made on a regular basis to determine who their users are and what their information needs might be.

   iii) Marketing and promotion of services is sadly lacking. At best there is limited promotion. Tight budgetary allocations do not allow for indulgence in this type of activity.

   iv) Very little evaluation is done of services rendered or of the information system as a whole. Lack of staff and work overload do not allow time for this activity.

l) The problem of maintenance of equipment surfaced in a couple of institutions. Either no allocations have been made for maintenance or the allocations are inadequate. In some places local firms which market the equipment do not honour service agreements and seemingly nothing effective can be done to change the situation.

m) Human resource problems are everywhere. The region was no exception. Complaints were heard on the lack of upward mobility for staff; that salary scales were low and that sometimes incompetent or inappropriately qualified persons get promoted to higher positions. These and other problems have an effect on staff morale. Inspite of the above problems staff morale was high.

n) Resource sharing in some places works better than in others. Where it did not work the following reasons were put forward to explain the situation:

   i) Resource sharing schemes do not have a practical orientation suited to the local conditions.

   ii) The reality that resource sharing and cooperation mean a committment of resources. While the desire to cooperate exists, the limited resources at their disposal makes it difficult to even carry out satisfactorily their own functions. Having to participate in a resource sharing scheme adds to the burden. The problem, however, is relative.

o) One information professional made the following observations which are worth noting:

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12 Micro CDS/ISIS is a database management software developed by Unesco and distributed free by Unesco or appointed national or regional distributors. It has been specially designed for bibliographic applications.

i) Information services should develop the ability to transform data into information if they are to satisfy information needs effectively.

ii) Information services can only be effective if they incorporate flexibility, timeliness and quality control in the operation of services and delivery of products.

iii) The need to establish a sound referral service.

iv) The concept of subsidy should be looked at in its proper perspective. When an information system is subsidized those who benefit from the use of the system do "pay back" in direct and indirect ways which, of course, is intangible.

v) The way to get people to appreciate the value of information is to work with them and demonstrate how information could be put to good use.

vi) Problem solving is really best done by person or persons knowledgeable in the field. They zero in on the problem and give you the exact information required at the time when the information is needed. This implies the need for subject specialization of information professionals or failing which the need to work together with subject specialists to operate an effective information service.

vii) Management and users do not really understand what it takes to process the information they want. Such an understanding may help in forging a better understanding and possibly greater support for the information system.

p) Among problems faced by information services the following are more challenging:

i) There is a genuine difficulty in understanding how information adds value and therefore its usefulness. If the usefulness of information can be demonstrated then it would be easier to convince appropriate authorities for adequate support.

ii) It is not easy to introduce ideas or innovations in information handling or dissemination if the environment you are placed in is not receptive or sometimes even hostile towards it.

iii) Despite all encouragement given how does one motivate staff when they are reluctant to experiment with new things (e.g. computers or adapt to changing situations.)

Visit to selected North American information systems

33. The purpose of visiting a few North American institutions (See Appendix III) was to study:

i) Their income generation capacities and related policies.

ii) Methods used in the marketing of information services.

iii) The effective use of information technologies.

A summary of the findings follows.

Income generation

34. Only a few of the information systems visited had specific policies towards the generation of income. Even though the others did charge for some of their services such charges were determined based on the need to recover the incremental costs of providing the service. Income generation in most cases was resorted to in view of demand from users outside their respective parent bodies. It seemed illogical to restrict the use of resources to institutional users especially where there was a need and demand for using them from interested groups outside the institution. However, free access to the exploitation of these resources would have meant being overwhelmed by outside demands at the risk of serving their legitimate users. Therefore policies were formulated to charge for services rendered. The following observations are pertinent to the operation of income generating practices:

a) There seems to be a general trend that a special unit is created within the information system charged with the purpose of providing information services based on a set of charges. The income generated is to cover the staff salaries of those manning the unit plus other expenditures incurred. In short the unit is supposed to run along commercial lines.

b) Charges were determined based on the policies of each institution. However, the trend seemed to be towards total cost recovery. Even though the element of profit figured in the formulation of charges, this was not openly declared in view of legal and other problems that may arise.

c) The products and services in most cases were based on the resources of the information system. In two cases, document delivery was the biggest income earner. This meant, of course, that the information system should be backed by a huge store of information resources, both current and retrospective.

d) Based on the income that had been generated over a number of years, it seemed clear that the generated income was equivalent to or more than the cost of staff and expenses incurred. The initial years were a little difficult, in that some deficits had to be faced.

e) In the more successful situations such as the Industrial and Business Information Service (IBIS) at the University of Waterloo and the Gelman Library at George Washington University, the units were able to purchase facilities such as microcomputers and telefax machines from the income generated, enabling them to conduct their operations more efficiently.

f) The cost of operating the information system was in all cases supported fully by the parent body. This illustrates quite clearly that it would not be possible, as has been promulgated by a few, to establish income generating policies and procedures with the purpose of covering all staff salary costs and other operating expenditures of an information system. This is not to say that it is impossible. Indeed, it may be possible given that the information service, with competent staff, has created or developed

information services or products suited to the needs of clientele who not only value information but are willing to pay for it. This implies the location of the information system in a vibrant economy.

g) One conclusion that may be drawn from this is that it may be possible to operate an information service (as against a range of services offered by a system) on a cost-recovery basis, provided that it is planned and implemented with that objective in mind and has the potential to achieve the objective. The photocopying service at the University of Beijing, China, has been cited as one such successful example. It may be added that a system could also operate on a basis that the profit derived from one service could subsidize another which is not generating sufficient income but still is important enough to continue to be maintained.

h) There are many libraries and information systems both in Canada and the United States which operate fee based services. Many are quite successful. Additional staff and other facilities required to operate the service are normally paid for by the income generated from the service. Clients for the service are usually from the business or industrial community.

i) Information systems in developing countries attempting to generate income could learn from the experience of those in North America. There are differences however that must be appreciated. There is a demand for information if it is valued in the context of the activity being carried out. The high literacy rates, high levels of commercial, industrial and research activity plus the economic ability to pay for services in a developed economy encouraged the income generation activities of information system. This may or may not apply in developing countries depending on their rate of development.

Marketing

35. The literature on marketing of information services abounds. In practice, the professional application of marketing methods to information services is not really evident, at least not in the systems visited, with the exception of one, which was unique in its own way. The approach to the marketing of information was observed to be casual. Deliberate marketing strategies and methodologies have not yet been developed. Due to the intricacies involveld in the marketing of information services the methodologies are evolving through experimentation. In the course of discussion, it was learnt that:

a) It was difficult (in one case) to determine who wants what service given a situation where a new fee-based information unit was being planned to serve, for example, a business community. What was surprising in the case was that an extensive survey was carried out followed by an appraisal of the situation. This serves to emphasise that the identification of the target clientele together with the determination of the types of services required is essential to income generation activity. One successful method was to move around with potential clientele that are to be served and try to

determine the services that might be required by them. Services subsequently should start off in a small way, and from then on being built upon and adjusted in concert with needs which get expressed.

b) Start-up costs of such a service need to be subsidised in the initial years. Getting parent body support is normally difficult. The IBIS service of the University of Waterloo servicing the business and industrial community was first supported by the parent body. After a period of development in the initial years the service is today self sufficient in that it pays for the costs of the entire operation.

Effective use of information technology

36. Intelligent use of information technology in information management has become necessary considering the volume of information to be handled, the high cost of labour, and the time-consuming nature of repetitive tasks. The following observation in the developed world on the use of information technology are being made with the developing countries in mind.

a) The use of microcomputers is pervasive. The range of applications and software used was overwhelming. A great deal of experimentation is also in progress. Some interesting applications and developments taking place are as follows:

i) The electronic storage of questions and answers built up over the years of answering information queries has been of great help in responding quickly to enquiries made.
ii) Database build-up of not just bibliographic files but also numeric and text files.
iii) The development of methodologies to extract pertinent sets of data from huge stores of data files.
iv) The development of an integrated library system using powerful microcomputers in a networked environment.

b) The potential of CD-ROM is being explored. Databases on CD-ROM are found everywhere. However, text files on CD-ROM are a challenge. Prototypes have been developed. There is a great deal of promise in terms of access to actual information via the CD-ROM format. Publications on a subject basis or institutional basis are being stored on CD-ROM so that access to information would be much easier. Problems of digitisation of information are currently being tackled. Later on, experiments are to be done in transmitting this stored textual information on optical disc across telephone lines to those who need them. The effect of this on the provision of document delivery service to developing countries at cheaper rates becomes a possibility. Further developments are awaited.

DELPHI SURVEY

37. A balanced assessment of a situation should include the views, evaluations, and judgement of persons knowledgable of the situation. The programme staff of the IDRC/ISD was one such group whose assessment on the sustainability of information systems in developing countries was sought. The group comprised of individuals who are eminently qualified, rich in experience coupled with a broad exposure to the situation faced by information systems particularly in the Third Word. It was considered that the best way to tap this source of vast knowledge was by the use of the delphi survey technique.

38. Preparations for the delphi survey included the following.

a) Draw up a near comprehensive list of the following:

i) Problems faced by developing countries;
ii) The criteria necessary for the attainment of sustainability;
iii) The methods used by developing countries to sustain their operations;
iv) Pre-conditions for sustainability.

To avoid confusion between the criteria for sustainability and pre-conditions for sustainability the following clarification is offered. The criteria for sustainability lists factors which relate to the management and operation of an information system thought to be necessary for the attainment of sustainability. Pre-conditions are a list of environmental factors and broad policy options which would be positive influences on the attainment of sustainability. Later on in this report a reference is made to indicators of sustainability.These refer to signs and development trends that are indicative of development directions leading to sustainability.

b) The expert group went through each of the above lists to add, delete or amend items on each list. It was after that exercise that the evaluative process was conducted.

c) The use of a software entitled VISION was used to compute individual input on problems, issues, and priorities. The software was able to display a collective view of a group either in the form of a priority listing or as a graphic representation.

Problems faced by information systems in developing countries.

39. The following problems were identified as those affecting information systems in developing countries:

a) Budgetary provisions;
b) Staff allocations and relative status;
c) Provision of equipment;

d) Management attitudes;
e) Maintenance of equipment;
f) Stability of parent organisation;
g) Office facilities;
h) Bureaucratic procedures;
i) Sharing of resources;
j) Access to publications
k) User attitude and temperament;
l) Planning and management of information systems;
m) Marketing and promotion of services;
n) Interaction with users;
o) Human resource development;
p) National infrastructure;
q) National information planning;
r) Professional attitudes;
s) Political situation;
t) Donor influence.

Of these, the following were considered the most important problems in order of priority:

Budgetary problems
Planning and management of information systems
Interaction with users
Human resource development
Marketing and promotion of services
Staff allocations and relative status
Stability of parent organisations
National infrastructure
Access to publications.

40. Asked to gauge problems which have the highest impact on information systems and which have a greater potential of being resolved, the response, as illustrated in Figure 1, may be interpreted as follows:

a) Problems which have the highest impact and about which something can be done are:
Planning and management of information systems;
Interaction with users;
Marketing and promotion of services;
Management attitudes.
The above are definitely within the realm of possibility and control of information systems to effect change.

b) Problems which have a high impact but which are beyond the control of information systems are:
Budgetary provisions;
Stability of parent organisation.
It comes out quite clearly that budgetary provisions have the highest impact on information systems. The possibility exists, however, that something

can be done about it, except that it may demand additional effort and creative approaches.

c) Problems which have a low impact but about which something can be done are:

Human resource development;
Access to publications;
Staff allocations and relative status.

The measure of low impact should be viewed in a relative sense. The impact is low in relation to the other problems. The fact that all these problems were accorded a higher priority status is itself testimony that they really have a high impact on information systems.

d) The only problem which was gauged as low impact about which nothing much could be done was the development of national infrastructure. The fact that it impacts on information systems cannot be denied. It looms in the background and has a great deal of direct and indirect influence.

As a guide to the interpretation of the data as presented in Figure I take the most important problem faced by information systems which was budgetary provisions. It is symbolised by number 1 on the concensus map. By virtue of its score that it has a high impact on information systems it is placed between 70 and 80 on the Y axis. In terms of how much can be done to improve budgetary provision most of the experts gave it 4 points on a scale of 9 on the X axis indicating that something could probably be done to improve the situation but would prove to be difficult. It may be interesting to point out that the attainment of sustainability is not dependent on one or two factors only but on the interaction and development of many factors which through a complex web and inter-relationship will jointly impact on the improvement and enhancement of the sustainability of information systems.

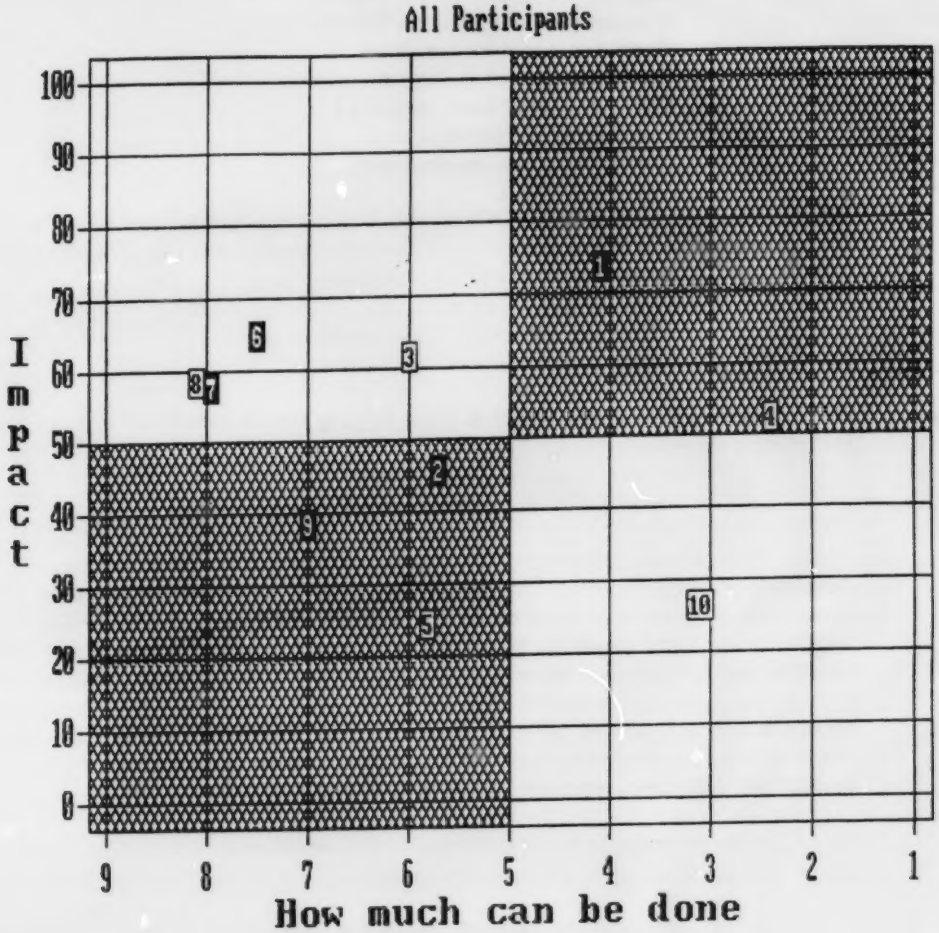
Criteria for sustainability

41. As explained earlier the criteria for sustainability is really a list of factors which relate to the management and operation of an information system thought to be necessary for the attainment of sustainability. The eleven criteria which were thought to be necessary for the attainment of sustainability of information systems are:

a) Support from parent organisation;
b) Good management practice;
c) Knowledge of users and information uses;
d) Appropriate use of technology;
e) Promotion and marketing of services;
f) Enhancing the value of information;
g) Optimum use of local resources;
h) Enhancement of self;
i) Generation of income;
j) Human resource development;
k) Minimising use of foreign exchange.

FIGURE 1

CONSENSUS MAP



1-A-1 Budgetary provisions
2-A-2 Staff allocations and relative status
3-A-4 Management attitudes
4-A-6 Stability of parent organization
5-A-10 Access to publications
6-A-12 Planning and management of information systems
7-A-13 Marketing and promotion of services
8-A-14 Interaction with users
9-A-15 Human resource development
10-A-16 National infrastructure

The consensus in order of priority of the first seven criteria are:

Support from parent organisation;
Knowledge of users and information uses;
Good management practice;
Promotion and marketing of services;
Optimum use of local resources;
Generation of income;
Human resource development.

42. The assessment of the criteria which had a high impact and which were easy to include in an IDRC/ISD project or and information system are (as shown in Figure 2):

Support from parent organisation;
Good management practice;
Knowledge of users and information uses;
Promotion and marketing of services;

43. Criteria that were thought to have a lower impact (relatively) and could easily be included in an information system are:

Human resource development;
Optimum of use of local resources.

Even though the criterion of income generation falls within the low impact and low possibility of being included in an information project, its possibility, however, should not be written off. A great deal depends on the nature of the project and the policy of the parent organisation. If, for example, the clients being served are in the rural areas and can ill afford to pay for services, income generation will naturally be given a low priority. Again, if it is not the policy of the parent organisation to charge, for whatever reason, then such a course of action would be futile. If, however, a potential exists and it is assessed that there would be no adverse reaction on the information system, then such a course of action would have a higher impact and could be included in a project.

44. A list of methods found to be useful in sustaining an information system was drawn up. It was decided not to get a collective view on this for the following reasons.

a) Some of the methods stated are arbitrary in that they may or may not work depending on the environment and how they are operated.

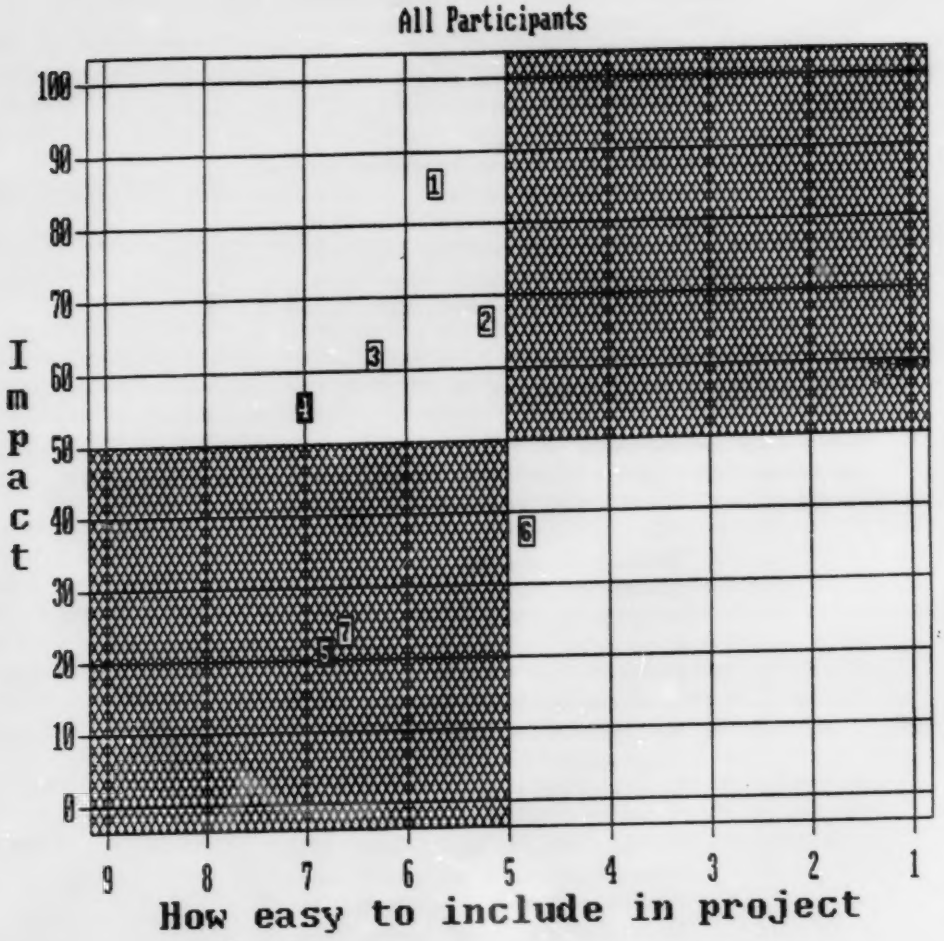
b) No one method will stand out as being responsible for sustainability. It will have to be a combination of a number of methods together with improvements in the environment in which the information system is located, cultural attitudes of users, and so on.

Some of the useful methods identified are given below. Please note that they are in no order of priority.

- Use of voluntary service;
- Use of grants from funding agencies;
- Providing constant justification to management;
- Acquiring testimonials from clients for support from management;

FIGURE 2

CONSENSUS MAP



1-B-1. Support from parent organization
2-B-2. Good management practice
3-B-3. Knowledge of users and information uses
4-B-5. Promotion and marketing of services

- Establishing goodwill;
- Provision of satisfactory services;
- Provision of current awareness services;
- Expand information related assignments;
- Cutting costs by enhancing efficiency;
- Standardisation of procedures;
- Seek user support to convince management of continued support;
- The use of a user committee as a means to achieve goals;
- Participate in user events;
- Using technology to provide efficient services;
- Efficient utilisation of funds;
- Determine user needs and try to meet them;
- Exploit existing organisational dissemination channels;
- Generate income by selling related tools (e.g., software);
- Market and promote products and services.

Pre-conditions for sustainability

45. As clarified earlier pre-conditions for sustainability are a list of environmental factors and broad policy options which would be positive influences on the attainment of sustainability. The following pre-conditions were identified.

a) Stable governments;
b) Stable institutions;
c) Adoption of enabling policies;
d) Support and co-operation, national and international;
e) Adequate staff;
f) Good communication systems;
g) Management awareness of importance of information;
h) Client support;
i) Good financial support
j) Access to financial resources;
k) Provide service to sectors willing to pay;
l) Tailor information to expressed need;
m) Promotion of services and their value;
n) Sound marketing of information services;
o) Evolving of systems to suit the situation they are placed in;
p) Clear mandate;
q) Sufficient number of users;
r) Provision of service to identifiable clientele.

The order of priority as assessed by the group is listed below:

- Good financial support;
- Sound marketing of information services;
- Management awareness of the importance of information;
- Stable institutions;
- Clear mandate;

- Adequate staff;
- Support and co-operation, national and international;
- Tailor information to expressed needs.

46. Among the lists that were drawn up for the delphi survey, a detailed breakdown of each major problem encountered and each criterion necessary for sustainability has been prepared. This is listed separately in Appendix IV. The detailed listing gives a greater insight in gaining a better understanding of the situation.

SUMMARY AND CONCLUSIONS

47. To better appreciate the issue of sustainability of information systems in developing countries it would be useful to understand the background in which they are placed. There is a divergence on the pattern of development from one country to another. The strategic choices that governments make reflects the political and economic situation of the country. Differences in the political culture, nature of the political organizations, in their leadership patterns, their bureaucratic processes, etc. point to the complex interaction between political and economic factors that determine growth and development of these countries. Apart from catering for the basic needs of the population like food, water, shelter, health, employment and education appropriate allocations need to be made to infrastructural, scientific, agricultural, industrial and commercial development. In the light of the above, the development of the information infrastructure inevitably takes lower priority.

48. At the risk of making a generalization, it may be safe to say, barring exceptions, that information systems in developing countries are not well supported, are understaffed, working in a resource poor situation to provide traditional services which are not well utilized. The resultant low key role of information in development and other forms of endeavour also have their effects. The lack of appropriate data and information in the planning process at all levels, implies that the process takes place in a situation of platonic, credal or modal ignorance[13] and an associated risk factor. Given a poor state of the economy, a country cannot afford to squander badly needed funds on poorly planned projects. There is a need to use information for productivity.[14] There are also risks involved if information is ignored.[15] Even though attempts have been made to study the

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13 Isaac Levi. Information and ignorance. Information Processing and Management. 20 (3): 355-362, 1984.

14 R. S. Taylor. Information and productivity: on defining information output. Social Science Information Studies 4: 31-41, 1984.

15 A. E. Cawkell. The risks of ignoring information. Information Services and Use 9: 325-326, 1990.

value of information[16] not much success has been reported. Inspite of this there is no denying that information is needed for a variety of purposes contributing to decision-making or problem-solving.[17]

49. It is generally acknowledged that information is a useful resource. It is difficult to prove that it is so. The management of information requires resources. But resources are hard to come by as management normally looks upon information systems as heavy expenditure items which do not generate income. Management generally adopts the attitude of paying lip service to such services. In the developing countries the situation is compounded by competing demands for other services leaving information systems in a general state of neglect. It might be noted here that there should be attempts made to gather evidence to prove that information is inextricably linked with development. There must be further attempts to relate information to the basic human needs for survival even if such a thought might be scoffed at. There is a need to prove beyond doubt that information is a strategic resource and that its management by information systems using information technology would make a difference in accelerating development and managing change.

50. Based on the information gathered for this study the inevitable question that must be answered is whether information systems in developing countries can attain sustainability. And if so what should it take to bring this about. The study started with the hypothesis that inspite of the situation in which information systems in developing countries are placed, possibilities exist for them to evolve over a period of time to put into place features that will enable them to achieve sustainability, partially or otherwise. There are strong indications that the hypothesis is found to be correct subject to the elaboration given below.

51. Information systems in developing countries have the potential to achieve sustainability providing the following factors are addressed to satisfaction:

a) That government policy be influenced positively towards support for information systems.
b) That attempts be made using a variety of methods and techniques to convince management on the value and benefits of information and its management.
c) That management exercise its option for a management audit of information systems to ensure that they specify their requirements and that information systems are responding accordingly.

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16 The Value of Information: Approaches in Economics, Accounting and Management Sciences. Journal of the American Society for Information Science 40 (2): 68-85, 1989.

17 H. R. Bronberg. The contribution of information to economic growth and development. In Ammundsen V (ed) Organisation and Economies of Information and Documentation. Proceedings of the 40th FID Congress; National Technological Library of Denmark, Copenhagen, 18-21 August 1980. The Hague. FID PUBLICATION 618: 23-36, 1982.

d) That there be a pronounced user orientation in the planning and design of products and services reflecting a response to user needs. There must be a constant interaction with the users to constantly monitor their needs and to demonstrate to them time and again the usefulness of information.

e) That attempts must be made to market and promote information services and products to create awareness and encourage a greater use of services and products.

f) That there must be the practice of good management for the efficient and effective operation of the system.

g) That there should be in place, where opportunities exist for participation in Resource Sharing Programmes and Co-operative Schemes.

h) That the training, development and continuing education of information professionals be a continual process incorporating the need to enhance new skills and in particular the ability for information analysis information repackaging and the application of information technologies.

i) That serious attempts be made to build, develop and manage co-operatively or otherwise, a database of local and or national information.

j) That there be developed through professional bodies and other mechanisms, the development of positive attitudes leading to self-reliance, confidence building and high levels of professionalism.

k) That there be effective use of information technology through the judicious choice of an appropriate mix of technologies suited to the local environment.

52. It must be emphasized that the attainment of sustainability has better chances if all or most of the factors stated above are acted upon in concert. There are situations which exist today where management have provided information systems with adequate support. The information systems, however, continue to operate along traditional lines offering products and services which are marginally used. Such information systems may eventually become victims when budgets get tighter or when realization dawns on management that the returns from information systems do not justify their existence. The factors outlined in paragraph 51 may be categorized into two. Factors a, b and c fall in the category of government and/or management action. The rest of the factors are to be acted upon by the information profession. Further elaboration of each of the above factors follows.

Government policy on information

53. The message has come out loud and clear from the response to the questionnaire, from the feedback from the Caribbean, from the results of the delphi survey and from the

professional literature[18],[19],[20] that government plays an important role in the provision of information services to the public and in shaping the information infrastructure of the country. To ensure that government does not overlook the development of this sector it is incumbent on the information professionals and others to bring to bear on government the need for adequate development and support to the information sector. How this can be brought about takes many forms. Since each country has its own circumstances and problems, the approach to resolving them requires ad hoc treatment. It may be that a national information policy is formulated and implemented. It could well work out that there is a national mechanism which ensures the planning and implementation of national information systems. It is crucial, however, for professional bodies to act as catalysts or change agents to bring this about. The role of aid agencies in support of such action will be invaluable. Positive attitude and support of government in the development of information systems in the country would pave the way towards the achievement of sustainability. There is another view expressed by Dejen Abate[21] which has merit. He says the "as much as projects rely on national capability building, in reverse the latter depends on infosystems projects as test-beds for technology application and adoption; as markets for trained manpower; as sources of operational knowledge and innovation; and cumulatively as sources of impetus for the quality development of information work". This view holds true in the developing country context. It also serves to emphasise that any form of development whether integrated or otherwise will have its influence and effect on general national development.

Value and benefits of information

54. As has been stated earlier it is difficult to measure the value of information or even what its benefits are in a manner that would be convincing. The nature of information and its use does not lend itself to much assessment. The management of information requires resources for which there is competing demand. Justifying the maintenance and development of information systems, therefore, poses a great challenge to the information professionals. To convince government and management that allocations made to information systems development are worthwhile investments there is a need to compile information, to conduct research and to discuss ways and means of determining the value

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18 E. E. Kaungamno. Problems and solutions in setting up library and information services in a developing country - The case of Tanzania. In Information for development. Proceedings of a Commonwealth Library Association Seminar, Nairobi, 3-4 March, 1983: 50-84.

19 M. G. Jones. Citizens' right to information: the role of government. Information Services and use 5: 37-47, 1985.

20 Sandy Morton. Information policies: strategies for the future. Special Libraries 82 (2): 158-162, 1990.

21 Comments by Dejen Abate on the draft copy of this report.

of information, its benefits and how without it governments can fail or businesses can fail. The role of aid agencies in sponsoring research, studies and the publication of special monographs on this topic would prove invaluable.

55. In a national context other methods have to be attempted in convincing government and management on the need for appropriate financial allocations to support information systems. The people to be convinced may be categorised as policy makers, top management in the civil service, chief executives of the parent institution, and the manager who in the organisational heirarchy has the information system as part of his overall responsibility. Each of the above needs to be approached differently. Visibility of the information professional in terms of his role in contributing to society through information system services must be constantly maintained particularly in the eyes of key officials. Directly serving their information needs has been found to be a successful approach.

Management audit of information systems

56. Management audits are never popular. Those who audit sometimes tend to be overbearing. Those whose actions get audited resent the process. Information systems as a rule are seldom evaluated. It is perhaps this reason, in addition to others, that has probably been responsible for the lack of adequate responsiveness of information systems to changing times and demands. What is pertinent though in the process is that management and users have to specify what is required of the information system. This and other related developments would gradually set directions in enabling the information system to adapt to changing demand and environment. Visibility of the system is bound to increase. There could be a greater understanding of how information systems are operated and the resources required to do so. The process would also keep the information professionals on their toes.

Marketing and promotion of services

57. One reason attributed to the poor use of information services has been the lack of awareness by potential users of the existence of specific services. Experiments using the marketing approach have shown interesting results[22]. The application of marketing concepts in information systems may even signal a change in the organizational structure, job description and the planning and design of services. There are, however, resource limitations that may hinder the application of marketing to information services.

Good management practice

58. There is no denying that all organizations can be further improved by good management practice. The establishment of objectives, fair division of labour, effective management structures, formulation of policies and procedures designed for efficiency, high levels of supervision, multi-level communications throughout the system, the building of

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22 H. Arthur Vespry. Marketing of information services products. Presented to the FADINAP/NFIS Regional Consultation of Information Services to end users. Bangkok, 20-24 Nov. 1989.

team spirit and harmonious inter-personal relationships will contribute to the effective and efficient running of an information system. Strong leadership, radiating enthusiasm and pride in group accomplishments add to the flavour. The above and more need to be infused in all information systems. The goal of providing quality services can be achieved over time with concerted effort towards that direction.

Resource sharing and cooperation

59. Resource sharing and cooperation which were buzzwords once seem to have lost their real meaning. Reduced budgets, increasing specialization and the realization that an information system cannot be completely self-sufficient in resources and information has forced institutions to resort to resource sharing programmes and cooperative schemes. The history and development of these activities shows that some schemes work better than others. The concern in the case of developing countries is to ensure that there is know-how on what needs to be done and how it should be done if a programme or scheme is being considered.

There has been feedback that such schemes fail because they lack the practicality of implementation. The willingness and ability to share resources is strong and positive if the situation in the Caribbean is representative of a developing country. The message that there is more to gain should come out strongly if there is to be effective resource sharing. There should also be the realisation that there should be mutual gain. Each party in a resource sharing scheme must be willing to and should commit resources to ensure the success of the scheme.

Training, development and continuing education of information professionals

60. The infusion of quality in information services and products requires qualified staff who know what to do and how to go about it. It was emphasized time and again that staff upgrading is badly needed by information systems in developing countries. Bearing in mind that information technology is changing the way things used to be done; the need to infuse marketing concepts in information science; the crying need to regularly interact with users to determine their needs; the need for analyzed information by our users and the need to factor information to suit targetted groups there is, therefore, a need to adjust the professional curricula of information professions to suit these changing situations. Choice of persons who have subject specialization before being trained as professionals is a possible trend. A judicious mix of theory, selected skill development and practice may be necessary. Ability to analyze information, use new technology effectively and to repackage or consolidate information is another need. It should also be borne in mind that continuing education of the professional helps to prevent burnout, to maintain interest in the work and to change and adjust to new situations.

Development of a local knowledge database

61. It is common for information systems in developing countries to be operated along the lines of those operated in developed countries. In this process access to information developed in the west has been given prominence over local information. There is an abundance of local knowledge that is yet to be captured and managed for use. Local information resources, directory type information, sources of statistical data, identification of

local expertise, etc. are not readily available. And yet in most countries a fair amount of information that is requested by users is local in nature. Efforts to capture and manage this information could be undertaken cooperatively. Depending on how the information has been captured, its validity and its relative value, there may be potential for such a database or databases to be sold commercially - an example of a public and private enterprise cooperation. The other possibility is that the database or part of it could be used to exchange for publications or other material from other countries.

Development of positive attitudes

62. There is low morale when working in a resource poor situation where the information system is little used; with bureaucratic environments hindering the efficient flow of work; users ranging from the apathetic, overcritical or dissatisfied; and management which does not provide the support required for reasons beyond their control or because they are not impressed with the services provided. Defeatist attitudes prevail among staff. There is the feeling that there is nothing much they can do given poor resources and little support. There is a need for strong individuals to provide leadership and enthusiasm; for professional bodies to use mechanisms to develop greater confidence and self reliant attitudes in information professionals. The message should be got across that there is still something that can be done to salvage the situation despite the bleak situation faced. Practical examples of what can be done and how will help as guides. It will be the infusion of positive and practical attitudes that will slowly help to bring about changes. A good example is determination of user needs. What counts here is interacting with the users in a professional manner to constantly monitor their needs. The only resource required is professional time. Tracing, collecting and managing local information and data is another activity which need not require too many resources.

Effective use of information technologies

63. To use technology effectively implies an understanding of the nature of the technology, how it can best be applied and in the situations in which it should be applied. Blind use of technologies or because it is fanciful to have may end up with the harbouring of white elephants or cumbersome use of technology that does not rightly fit in with the application. Some things are better done manually than by the computer. Another problem is one of the choice of technology. Wanting the best technology even though there is no local servicing or support facility has its attendant problems. Using a software that has not been well evaluated may mean the redoing of things when a switch is made in the software. Developing countries have an advantage over developed ones if they could take advantage of the experience of using technology in the developed situations. By avoiding their mistakes and following the general trends that have been set saves a lot of time, effort and money.

The other point to be made is that the judicious use of a mix of information technologies, if they are available, will help in improving productivity without the need to add more staff.

Recommendations to IDRC/ISD for consideration

64. There is a concern that if sustainability as defined for the purposes of this study is used as a criterion for the choice of future projects to be supported, then it may be that many a potential project may be sidestepped or not provided with the support it needs. It is suggested that IDRC/ISD projects may be classified as outlined below:

a) Those which satisfy some of the criteria and pre-conditions for sustainability and therefore are on the road towards the attainment of sustainability.

b) Those which satisfy one or so criteria for sustainability signifying that there is promise in the attainment of sustainability over a period of time if attention is paid to the development of other criteria.

c) Those which do not satisfy any criteria for sustainability. Aid that is administered should be aimed at development that would eventually satisfy some of the criteria for sustainability.

65. It is suggested that the following tools, if developed, will aid in determining the potential of projects in the attainment of sustainability:

a) A database of the status of the information world in each country where IDRC/ISD has projects. Such information, developed over a period of time with regular updates will be invaluable in getting an overview of the environment in which a potential project is placed in. Each new project should be able to benefit from relevant experiences (locally, regionally and elsewhere) and avoid duplication (especially locally). To start with the data base could be developed in select and manageable cases eg. Loas. If found to be useful it could be developed further to cover other countries and regions.

b) A checklist outlining the criteria and pre-conditions for sustainability as listed in Appendix V and VI.

c) There needs to be developed as a follow up of this study, if thought to be useful, a checklist of indicators of sustainability. This probably would consist of broad qualitative indicators. A great deal of subjectivity will no doubt be involved in assessments that are to be made. As explained earlier indicators of sustainability are signs and developments trends that are indicative of development directions leading to sustainability. Indicators are a possible tool to understand and assess changes that are taking place in information systems. For example an increase in the use of a service may be due to various factors which may or may not be determined. If the increase is however constant and on an upward trend then this is an indicator which establishes the need for a service and by implication strengthens the quality of sustainability of that system. The study of indicators could evolve into observing and determining catalytic and other factors that bring about change in an information system.

66. The IDRC/ISD currently adopts a responsive attitude to most project requests that it supports. It is suggested that a pro-active approach also be adopted. Such an approach will allow for research, experimentation and the exploration of trends in technology

application and development. The results of such projects would have a bearing on future policy decisions.

67. It is felt that there is a need to establish flexible mechanisms to build in sustainability factors or attempt to do so in the implementation of projects. This could be done at the following stages using discretion and overall judgement:

a) At the pre-project phase when discussions are underway. Appropriate financial allocations should be made for pre-project appraisal studies, if necessary.
b) At the project phase.
c) At the post-project phase.

Details in terms of what should be done at each phase are not forthcoming. If it is felt that this is necessary then a brainstorming session among programme officers will achieve the best results in securing the necessary details and a subsequent checklist.

68. The role that programme officers play directly or indirectly in the attainment of sustainability of projects is outlined below. It must be emphasized that what follows are mere suggestions with no intention to tread on sensitivities and with the knowledge that in all probability the suggestions below are already being carried out:

a) There are occasions, depending on the circumstances, which demand a greater degree of involvement of programme officers in the planning and implementation of projects. Some examples of the type of involvement required are:
   i) Where help is really needed, suggestions of various options available with their respective implications may be put forward. It is better to adopt the approach of determining something with somebody by discussion rather than wait for a decision to be made and then make a judgement on it.
   ii) By offering advice in the use of appropriate implementation mechanisms.
   iii) Using the observations of the first visit to the project site as a benchmark, changes observed as a result of subsequent visits should be recorded. It is these changes such as increased morale, improved products, responsiveness to services, improved productivity of staff trained under the project etc. that could be used as possible indicators to aid in monitoring, evaluating and assessing the project.

b) Meet senior officers of the parent body where the project is being administered with the purpose of impressing upon them in subtle but effective ways the value and importance of information, both generally and specifically related to the project. Examples of other projects or ways in which information has helped to resolve major problems would at least incrementally convince management on the need to support information systems. Such an action should be seen as complementary to the efforts of local information professionals. This is not to imply that management is

not aware of the importance of information. Depending on the country concerned, each has to be approached in accordance with the cultural attitudes and traditions concerned. Sometimes a representative of a foreign aid agency can act as a catalyst in influencing decisions. In addition there are competing demands on management for resources. All effort therefore in maintaining the visibility of the information system should be made. It is in this light that the above suggestion is being made.

c. Transmission of related information from other sources to project managers from time to time. This includes experience and information from other projects, published information, etc.

69. It is obvious that IDRC/ISD cannot tackle all the major problems affecting the sustainability of information systems. It may be opportune therefore to consider working in concert with other aid agencies to tackle the various aspects of sustainability on a country basis.

70. The development of information systems leading towards sustainable development should be viewed as a multi-phased development with each phase shading into the next. Awareness of what should be done to achieve sustainability is the first step. The subsequent developments will depend upon a definite course of action being taken simultaneously or on a phased basis on all fronts. It is only with time and targetted action that sustainable development of information systems in developing countries will be a reality.

Further areas of research and study

71. A short period of six months is definitely inadequate to study the concept of sustainability of information systems in sufficient depth. Given below are some areas of further research and study that can throw further light on the subject:

a) Methods that can be used to convince management at levels in the private and public sector agencies on the importance of information.

b) Case studies on the relationship between information and development in a variety of situations.
   e.g. Increased profits in business.
   Access to greater share of markets.
   Use of latest technique or technology in manufacturing.
   Effects on decision-making.

c) Effects of ignorance, misinformation and lack of information on the quality of decisions made.

d) Effective uses of information technologies in developing countries.

e) Encouraging the use of information at all levels of society - strategies and methods that will develop it.

f) Marketing and promotion of information services in non-profit organizations.

g) The process of information provider/user interaction (the participation process).

h) Strategies, methods and techniques to change and improve professional attitudes.

i) Development of guidelines for the management audit of information systems.

j) Studies on the value of information to different kinds of users and methodologies on how to measure value.

k) Development of case study market plans for different kinds of information systems.

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CANADA

International Development Research Centre
Centre de recherches pour le développement international

Questionnaire on the sustainability of information systems in developing countries

In order to elicit a frank and honest response the respondent would remain anonymous. Your co-operation is sought in returning the filled questionnaire as quickly as possible but preferably within two weeks of receiving it. Additional information related to the topic may be attached to the returned questionnaire. Many thanks for your attention.

For purposes of clarification the concept of sustainability as it is applied to information systems is concerned with the maintenance and continuity of an information system over a long term, enabling it to perform its functions effectively in accordance with its mandate and objectives so that it may satisfy the information needs of its user community.

In the context of this study, an information system is an operation which is established to meet the information needs of a community of users, involving a coherent series of formally-designed, "value-added" processes to achieve its information objectives. Examples of an information system include a specialized information centre, a special library, a mass media facility such as journal or periodical publishing, an information analysis centre, a referral service or an information repackaging unit.

1. Please furnish some basic information on the nature and location of your Organization.

   a) Geographic location _____
   (name of country)

   b) Type of Organization
   ___ Government
   ___ Semi-Government
   ___ Non-Government Organization (NGO)
   ___ International
   ___ Private
   ___ Other

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c) Nature of Organization
(Please tick more than one, if necessary)

___ Educational
___ Agricultural
___ Financial
___ Legal
___ Industrial
___ Commercial
___ Medical and Health
___ Social
___ Environmental
___ Scientific
___ Research
___ Other

d) Types of Users served
(Please tick more than one, if necessary)

___ Policy makers
___ Planners
___ Researchers
___ Students
___ Academic Staff
___ Professionals
___ Extension workers
___ Industrialists
___ Rural populations (Farmers, fisher-(men, etc.)
___ Entrepreneurs
___ Others (Please specify)

_____
_____
_____

2. What is the total financial allocation inclusive of staff salaries, made to your information system this year?
(Please state amount converted to US currency)

3. How do you rate the allocation in terms of enabling you to achieve the objectives of your information system?
(Please circle appropriate number)

Adequate 1 2 3 4 5 Inadequate

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May 23, 1990

Dear Colleague,

SUSTAINABILITY OF INFORMATION SYSTEMS IN DEVELOPING COUNTRIES

Your assistance is required in providing a quick response to the attached questionnaire, which has been designed to gather pertinent information on the above mentioned topic. I am currently conducting research on the above topic during the course of my six month sabbatical leave starting 15 April 90. During this period I shall be attached to the Information Sciences Division, International Development Research Centre (IDRC), Ottawa, Canada. It is my belief that a combination of factors put into place suited to differing circumstances may pave the way towards the achievement of sustainability of information systems in developing countries.

In order to arrive at realistic and pragmatic solutions, if any, I require frank and honest feedback from those who are actually involved in the management and operation of information systems in developing countries or possess first hand knowledge on them. It is for this reason that you have been approached to respond to the attached questionnaire. Your response would be invaluable in reflecting the actual state of affairs affecting information systems in developing countries.

For purposes of clarification the concept of sustainability as it is applied to information systems is concerned with the maintenance and continuity of an information system over a long term, enabling it to perform its functions effectively in accordance with its mandate and objectives so that it may satisfy the information needs of its user community.

In the context of this study, an information system is an operation which is established to meet the information needs of a community of users, involving a coherent series of formally-designed,"value-added" processes to achieve its information objectives. Examples of an information system include a specialized information centre, a special library, a mass media facility such as journal or periodical publishing, an information analysis centre, a referral service or an information repackaging unit.

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Due to the limited time set for the study, your co-operation in responding quickly to the questionnaire would be most appreciated. In addition, keeping alive the spirit of South-South co-operation has its benefits as there is much that we can achieve together. Thank you for your time in filling out the questionnaire.

Towards solutions for Third World development.

Yours sincerely,

Syed Salim Agha
Chief Librarian
Universiti Pertanian Malaysia
and currently located at IDRC,
Ottawa, Canada

Encl.

4. How many staff positions do you have at present?

a) Professional staff _____

b) Support staff _____

5. Are the positions sufficient to carry out the major functions of your information system?
(Please circle appropriate number)

Sufficient				Insufficient
1	2	3	4	5

6. What problems do you face in the production and development of your current products and services?
(Please tick one or more, as applicable)

___ Insufficient staff
___ Lack of funds
___ Lack of equipment
___ Equipment maintenance problems
___ Staff require adequate training
___ Lack of space
___ Others (Please describe)

_____
_____
_____

7. What measures are used for the promotion of your system and its resources?

___ Distribution of printed brochures
___ User Education programmes
___ Promotion through mass media
___ Advertisement in journals, newsletters, etc.
___ Others (Please describe)

_____
_____
_____

8. The concept of sustainability, as explained in the covering letter, is concerned with maintenance and continuity of an information system so that it may satisfy the information needs of its users. In this connection what are the problems you face in sustaining your information system, if any?
(Please tick one or more as applicable)

___ Reduced budget
___ Reduced staff support
___ Reduced user demand for services
___ Insufficient facilities
___ Not permitted to charge for services
___ Need to upgrade staff capabilities
___ Other. Please describe

_____
_____
_____

9. How have you overcome your problems of sustaining your information system?

___ Have convinced management on the need for continued support
___ Have charged for some services
___ Have charged for all services
___ Have tried some approaches but failed
___ Have done nothing
___ Other. Please describe

_____
_____
_____

10. Please list methods, ways and means that have been found to be useful to sustain your information system.

_____

_____

_____

11. In your situation would you be able to generate some income from your products and services?

___ Yes. Please describe

_____

_____

_____

___ No. Please give reasons

_____

_____

_____

12. Please list approaches that have failed in your efforts to achieve sustainability.

_____

_____

_____

13. In your opinion is it feasible for information systems in your country to attain sustainability?

___ Yes

___ No

Please elaborate

_____

_____

_____

14. What do you think are the basic pre-conditions or requirements necessary to achieve sustainability in your situation? (Please elaborate)

_____

_____

_____

15. Please make any other suggestions or comments relevant to the topic of sustainability of information systems, including examples of systems or methods you know are successful in attaining sustainability

_____

_____

_____

_____

_____

THANK YOU FOR YOUR TIME

Please mail the questionnaire to:

Syed Salim Agha
Information Sciences Division
International Development Research Centre
Box 8500, Ottawa, Canada, K1G 3H9

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Centre de recherches pour le développement international

23 mai 1990

Cher Collègue,

DURABILITÉ DES SYSTEMES D'INFORMATION DANS LES PAYS EN DÉVELOPPEMENT

Nous faisons appel à votre assistance pour répondre rapidement à ce questionnaire qui a été préparé afin de rassembler une information pertinente sur le sujet susmentionné. J'effectue présentement une recherche sur ce sujet durant mes six mois de congé sabbatique, entamé le 15 avril 1990. Au cours de cette période, je travaillerai au sein de la Division des Sciences de l'information du Centre de Recherches pour le Développement International (CRDI), Ottawa, Canada. Je crois que la mise en place d'un ensemble de facteurs appropriés à différentes situations ouvrirait le chemin vers la viabilité des systèmes d'information dans les pays en développement.

Dans le but de déboucher sur des solutions réalistes et pragmatiques, s'il y a lieu, je demande une réaction franche et honnête de tous ceux qui sont effectivement impliqués dans la gestion et l'opération des systèmes d'information dans les pays en développement ou de tous ceux qui en possèdent une connaissance directe. C'est pour cette raison que je m'adresse à vous pour répondre à ce questionnaire. Votre réponse reflétant l'état actuel des faits affectant les systèmes d'information dans les pays en développement sera inestimable.

Pour des raisons de clarification, le concept de viabilité, ou de durabilité tel qu'il s'applique aux systèmes d'information, concerne le maintien et la continuité des systèmes d'information à long terme, leur permettant ainsi de remplir effectivement leurs fonctions en rapport avec leur mandat et leurs objectifs pour la satisfaction des besoins d'information de la communauté des usagers.

Dans le contexte de cette étude, un système d'information peut se définir comme une opération mise en place pour répondre aux besoins d'une communauté d'usagers, et qui comporte un ensemble cohérent de processus de "valeur ajoutée" conçus formellement pour atteindre des objectifs d'information.

... 2

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Parmi les exemples de systèmes d'information notons les centres spécialisés d'information, les bibliothèques spécialisées, les services de publication de masse tel que, journaux ou périodiques, les centres d'analyse d'information, les services de référence et les unités de reformattage de l'information.

Vu le temps limité disponible pour cette étude, j'apprécierais grandement que vous répondiez rapidement à ce questionnaire. En plus, garder à l'esprit la coopération Sud-Sud a ses avantages étant donné qu'il y a tant de choses que nous pouvons accomplir ensemble.

Je vous remercie du temps que vous consacrerez à répondre à ce questionnaire et je vous prie d'agréer, cher collègue, l'expression de ma considération distinguée.

En route vers les solutions pour le développement du tiers monde!

Syed Salim Agha
Bibliothécaire en Chef
Université Pertanian Malaysia
présentement au CRDI, Ottawa, Canada

Annexe

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Centre de recherches pour le développement international

Questionnaire sur la durabilité des systèmes d'information dans les pays en développement

Le répondant demeurera anonyme dans le but d'encourager des réponses franches et honnêtes. Nous vous serions très reconnaissants de bien vouloir retourner ce questionnaire dûment rempli le plus vite possible et de préférence dans les deux semaines qui suivent la réception. Vous pouvez joindre au questionnaire toute autre information relative à ce sujet.

Pour des raisons de clarification, le concept de viabilité, ou de durabilité tel qu'il est appliqué aux systèmes d'information concerne le maintien et la continuité des systèmes d'information à long terme, leur permettant ainsi de remplir effectivement leurs fonctions en rapport avec leur mandat et leurs objectifs pour la satisfaction des besoins d'information de la communauté des usagers.

Dans le contexte de cette étude, un système d'information peut se définir comme une opération mise en place pour répondre aux besoins d'une communauté d'usagers, et qui comporte un ensemble cohérent de processus de "valeur ajoutée" conçus formellement pour atteindre des objectifs d'information. Les exemples de système d'information comprennent un centre spécialisé d'information, une bibliothèque spécialisée, un service de publication de masse tel que, journaux ou périodiques, un centre d'analyse d'information, un service de référence ou une unité de reformattage de l'information.

Nos vifs remerciements pour l'attention que vous accorderez à ce questionnaire.

1. **Veuillez donner une information de base sur la nature et l'endroit de votre organisation.**

   a) **Endroit** _____
   (nom du pays)

   b) **Genre d'organisation**

   ___ **Gouvernementale**
   ___ **Semi-gouvernementale**
   ___ **Non-gouvernementale (ONG)**
   ___ **Internationale**
   ___ **Privée**
   ___ **Autre**

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c) Nature de l'organisation (Svp cochez plus qu'un si nécessaire)

___ Educative
___ Agricole
___ Financière
___ Légale
___ Industrielle
___ Commerciale
___ Médicale et Sanitaire
___ Sociale
___ Environnementale
___ Scientifique
___ Recherche
___ Autre

d) Genres d'usagers servis (Svp cochez plus qu'un si nécessaire)

___ Décideurs politiques
___ Planificateurs
___ Chercheurs
___ Étudiants
___ Personnel académique
___ Professionnels
___ Travailleurs
___ Industriels
___ Population rurale (Agriculteurs, pêcheurs, etc.)
___ Entrepreneurs
___ Autres (Svp précisez)

_____
_____
_____

2. Quelle est l'affectation financière totale y compris les salaires du personnel que vous avez octroyée à votre système d'information cette année? (Svp donnez un montant converti en dollars US)

3. Comment qualifiez-vous cette affectation par rapport aux objectifs que poursuit votre système d'information? (Svp cerclez le chiffre approprié)

Adequate 1 2 3 4 5 Inadequate

4. **Combien de postes avez-vous en ce moment?**

   a) **Personnel professionnel** _____

   b) **Personnel de soutien** _____

5. **Les postes sont-ils suffisants pour mener à bien les fonctions principales du système d'information?**

   (Svp cerclez le chiffre approprié)

Suffisants				Insuffisants
1	2	3	4	5

6. **Quels genres de problèmes rencontrez-vous dans la production et le développement de vos produits et services actuels? (Svp cochez toutes les réponses appropriées)**

   ___ **Personnel insuffisant**
   ___ **Carence de fonds**
   ___ **Manque d'équipement**
   ___ **Problèmes d'entretien de l'équipement**
   ___ **Personnel pas suffisamment formé**
   ___ **Manque d'espace**
   ___ **Autres (Svp décrivez)**

   _____
   _____
   _____

7. **Quelles mesures utilisez-vous pour la promotion de votre système et de ses resources?**

   ___ **Distribution de brochures imprimées**
   ___ **Programmes d'éducation des usagers**
   ___ **Promotion à travers les mass médias**
   ___ **Publicité dans les journaux, colonnes, etc.**
   ___ **Autres (Svp décrivez)**

   _____
   _____
   _____

8. **Le concept de durabilité tel qu'il est défini dans la lettre de transmission concerne le maintien et la continuité des systèmes d'information pour la satisfation des besoins d'information de ses usagers. Dans cet ordre d'idées, quels sont les problèmes que vous rencontrez et qui nuisent à la durabilité de votre système dinformation, s'il y a lieu?**

___ Budget réduit
___ Personnel de soutien réduit
___ Demande de service reduite de la part de l'usager
___ Moyens réduits (équipement, mobilier ...)
___ Interdiction de faire payer les services
___ Besoin d'augmenter les capacités du personnel
___ Autre. (Svp décrivez)

_____
_____
_____

9. **Comment avez-vous résolu vos problèmes de durabilité de votre système d'information?**

___ Vous avez persuadé la Direction du besoin de soutien continu
___ Vous avez vous fait payer certains services
___ Vous avez vous fait payer tous les services
___ Vous avez vous essayé certaines méthodes qui ont échoué
___ Vous n'avez rien fait
___ Autre. (Svp décrivez)

_____
_____
_____

10. **Veuillez citer les méthodes et les moyens que vous avez trouvés utiles pour soutenir votre système d'information.**

_____

_____

_____

11. **Dans la situation où vous vous trouvez seriez-vous capable de tirer un certain revenu de vos produits et services?**

___ **Oui. (Svp décrivez)**

_____

_____

_____

___ **Non. (Svp. donnez les raisons)**

_____

_____

_____

12. **Veuillez donner une liste des approches qui ont échoué, pour une raison ou une autre, en vue d'assurer la durabilité**

_____

_____

_____

13. **A votre avis est-il faisable que les systèmes d'information dans votre pays puissent atteindre la durabilité?**

___ **Oui**

___ **Non**

Svp. explicitez.

_____

_____

_____

14. Que pensez-vous être les conditions et les exigences préliminaires nécessaires à la réalisation de cette durabilité dans votre cas? (Svp expliquez)

_____

_____

_____

15. Veuillez donner toute autre suggestion ou commentaire en rapport avec le sujet de durabilité des systèmes d'information.

_____

_____

_____

Merci du temps que vous consacrez à ce questionnaire.

Veuillez retourner le questionnaire dûment rempli à:

Syed Salim Agha
Division des Sciences de l'Information
Centre de Recherches pour le Développement International
B.P. 8500, Ottawa, Canada, K1G 3H9

LIST OF PERSONS VISITED IN THE CARIBBEAN

23 July 1990

Kingston, Jamaica

1. Mrs Swarna Bandara, Science Library, University of West Indies, Mona Campus.
2. Prof Daphne Douglas, Dept. of Library Studies, University of West Indies, Mona Campus.
3. Mrs Audrey Chambers, Institute of Social and Economic Research, University of West Indies, Mona Campus.
4. Mr Karl F. Richards, Caribbean Energy Information System.
5. Mrs M. E. Bardowell, Scientific Research Council, Jamaica.
6. Mrs Sheila Lampart, National Council on Libraries, Archives and Documentation Services, Ministry of Mobilisation, Information and Culture.
7. Miss Stephney Ferguson, Director, National Library of Jamaica.
8. Mr John Aarons, Deputy Director, National Library of Jamaica.
9. Mr Byron Palmer, National Library of Jamaica.

24 July 1990

Kingston, Jamaica

1. Mrs Arlene Onanaiwn, Chief Librarian, Planning Institute of Jamaica.

25 July 1990

Barbados

1. Mrs Judy Blackman, Director, National Library Service, Barbados Library, Archives and Information.
2. Mr Michael Gill, Librarian University of West Indies, Barbados.

26 July 1990

Barbados

1. Dr Jefferey Dellimore, Caribbean Development Bank, Barbados.

27 July 1990

Trinidad

1. Mrs Wilma Primus, UNECLAC, Trinidad.

2. Mr Boris Fabres, FIMIS.

3. Ms Shirley Evelyn, Head, Readers Services, The Main Library, The University of West Indies.

LIST OF PERSONS VISITED IN THE NORTH AMERCIA

21 August 1990

Waterloo

1. Ms Faye Abrams, Co-ordinator, Industrial and Business Information Service (IBIS), Davis Centre Library, University of Waterloo.

Guelph

1. Dr John B. Black, Chief Librarian, University of Guepih.

22 August 1990

Hamilton

1. Dr P. K. Abeytunga, Director, Information Systems Services, Canadian Centre for Occupational Health and Safety.

2. Ms Wendy Newman, Director, Information Services, Canadian Centre for Occupational Health and Safety.

23 August 1990

St. Catherines

1. Ian Gordon, Science Librarian, Brock University.

24 August 1990

Ithaca

1. Albert Mann Library, Cornell University.

27 August 1990

Washington

1. Mr Joseph H. Howard, Director, National Agricultural Library.

2. Ms S. Rogers, Chief Librarian, Gelman Library, George Washington University.

SUSTAINABILITY OF INFORMATION SYSTEMS IN DEVELOPING COUNTRIES

Sustainability of Information Systems in Developing Countries

It is common knowledge that information systems in developing countries face many problems. Since information plays a crucial role in the process of development, it follows that agencies that collect, organise, store and disseminate information should be well supported. Unfortunately such support is not forthcoming. In view of this, information systems in developing countries are aided sometimes by donor organisations to improve their lot in order to fulfill their objectives. It has been observed that such information centres normally function quite satisfactorily as long as aid lasts. Subsequently in most cases there is either a reduction in the quality and level of the service or the service ceases to play a useful role. This study on the sustainability of information systems in developing countries attempts to identify problems faced by developing countries and to determine criteria that would be helpful in the attainment of sustainability. In addition other relevant information is also sought.

In view of your rich experience, broad exposure and first hand knowledge of information systems in developing countries, your assistance is solicited in providing appropriate feedback. Your carefully considered response to the questions that follow would be useful in the search for answers and solutions to the question of sustainability of information systems in developing countries.

For purposes of clarification the concept of sustainability as it is applied to information systems is concerned with the maintenance and contiuity of an information system over a long term, enabling it to perform its functions effectively in accordance with its mandate and objectives so that it may satisfy the information needs of its user community.

In the context of this study, an information system is an operation which is established to meet the information needs of a community of users, involving a coherent series of formally-designed, "value-added" processes to achieve its information objectives. Examples of an information system include a specialized information centre, a special library, a mass media facility such as journal or periodical publishing, an information analysis centre, a referral service, an information repackaging unit, extension services or advisory services.

As information is pervasive, it is used in its complex variety by people in all walks of life. Information in this study is conceived as data which is perceived to be useful by a user at a point in time. Usefulness may be interpreted as having reduced uncertainty, helped to resolve a problem, aided in a decision making process or has enhanced the value judgement on an issue concerned. Information therefore need not necessarily be confined to that found only in published material.

The approach adopted in this exercise is first to identify problems faced by information systems in developing countries. In order to determine the situation information system should be placed in, if they are to achieve sustainability, a list of appropriate criteria has been drawn up. Having done this, a list of practical methods that have paved the way to the attainment of sustainability have been drawn up. This is followed by a list of jailed methods which should be noted for reference and information. A list of pre-conditions to the attainment of sustainability has been made. This list needs to be discussed further in terms of desirability of having such a list and its impact on the planning and implementation of projects. All the above mentioned lists need to be discussed and evaluated in terms of their importance and impact on the question of sustainability of information systems in developing countries.

Information systems in developing countries face many problems. These problems are listed below under broad subjects. Are there any significant omissions from the list?

A Problems Faced by Information Systems in Developing Countries

1. Budgetary provisions **1**
2. Staff allocations and relative status **4**
3. Provision of equipment
4. Management attitudes **6**
5. Maintenance of equipment
6. Stability of parent organization **5**
7. Office facilities
8. Bureaucratic procedures
9. Sharing of resources
10. Access to publications **6**
11. User attitude and temperament
12. Planning and Management of Information Systems **2**
13. Marketing and promotion of services **4**
14. Interaction with users **3**
15. Human Resource Development **3**
16. National infrastructure **6**
17. National Information Planning
18. Professional attitudes
19. Political situation
20. Donor influence

Please rank the above in order of importance.

Axis of analysis: Y, impact on sustainability

X, how much can be done

All Participants

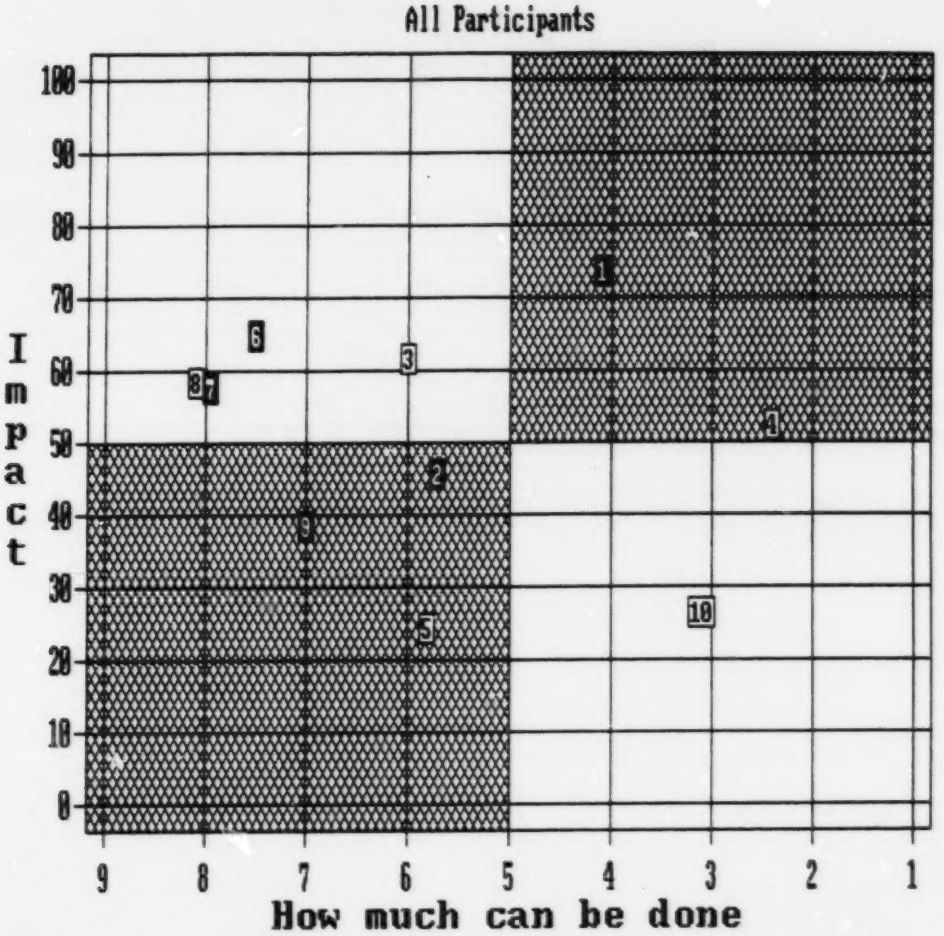
ɜ Description	Y Axis(Rank)	X Axis(Rank)	Consensus Y	Consensus X	Q
-1 Budgetary provisions	73.5 (1)	4.1 (8)	Y	Y	2
-2 Staff allocations and relative status	45.3 (7)	5.7 (7)	Y	Y	3
-4 Management attitudes	61.5 (3)	6.0 (5)	Y	N	1
-6 Stability of parent organi	52.1 (6)	2.4 (10)	N	Y	2
-10 Access to publications	24.1 (10)	5.8 (6)	N	Y	3
-12 Planning and management o ɪformation systems	64.6 (2)	7.5 (3)	Y	Y	1
-13 Marketing and promotion o ɜrvices	56.5 (5)	8.0 (2)	Y	Y	1
-14 Interaction with users	58.2 (4)	8.1 (1)	N	Y	1
-15 Human resource developmen	38.3 (8)	7.0 (4)	Y	Y	3
-16 National infrastructure	26.2 (9)	3.1 (9)	Y	N	4

Issue Segregation Summary

All Participants

Q1:	3-A-4 Management attitudes 6-A-12 Planning and management of information systems 7-A-13 Marketing and promotion of services 8-A-14 Interaction with users
Q2:	1-A-1 Budgetary provisions 4-A-6 Stability of parent organization
Q3:	2-A-2 Staff allocations and relative status 5-A-10 Access to publications 9-A-15 Human resource development
Q4:	10-A-16 National infrastructure

CONSENSUS MAP



-1 Budgetary provisions
-2 Staff allocations and
elative status
-4 Management attitudes
-6 Stability of parent organization
-10 Access to publications
-12 Planning and management of
nformation systems
-13 Marketing and promotion of
ervices
-14 Interaction with users
-15 Human resource development
10-A-16 National infrastructure

Problems related to the subject concerned are listed below. Are there any omissions?

A 1 Budgetary Provisions

1.1 No regular budget
1.2 Low budget allocation/competition for funds
1.3 Regular budget cuts
1.4 Budgetary allocations on paper only
1.5 Cumbersome budgetary procedures
1.6 Slow purchasing procedures
1.7 Slow payment routines
1.8 Lack of flexibility in administering budgets
1.9 Short-term planning
1.10 No provision to offset effects of inflation
1.11 Low allocations or none at all for capital expenditures.
1.12 Restrictions on how funds can be used
1.13 Budgeting process not very well understood
1.14 Rate of release of funds irregular
1.15 Dependence on external donors
1.16 Misappropriation of budgets
1.17 Foreign exchange restrictions/fluctuations

Please rank the above in order of importance

Problems related to the subject concerned are listed below. Are there any omissions?

A 2 Staff allocations and relative status

2.1 Inadequate staff allocations
2.2 No professional staff allocated
2.3 No support staff provided
2.4 Low staff salaries
2.5 High staff turnover
2.6 Low staff morale
2.7 Low staff productivity
2.9 Staff holding professional posts but not qualified
2.10 Unfilled vacancies/unavailability of skilled labour
2.11 Little or no upward mobility of staff
2.12 Low status of information within organization
2.13 Patronage

Please rank the above in order of importance

Problems related to the subject concerned are listed below. Are there any omissions?

A 3 Provision of Equipment

3.1 No equipment provision

3.2 Occasional equipment provision

3.3 Access allowed for organizational equipment

3.4 Difficulty in use of organizational equipment

3.5 Obsolescence of equipment seldom considered

3.6 Inappropriate equipment supply

3.7 Lack of consultation re purchase of equipment

Please rank the above in order of importance.

Problems related to the subject concerned are listed below. Are there any omissions?

A 4 Management Attitudes

4.1 Pay lip service to information services/negative attitude

4.2 Lack awareness of importance of information function

4.3 Locate information services inappropriately in organizational structures

4.4 Low status accorded to information related functions and personnel

4.5 Allocate information handling responsibilities to non qualified personnel

4.6 Low quality supervision

4.7 Promote information staff to higher levels of incompetence

4.8 Lack of appropriate delegation of responsibility and authority

4.9 Lack of understanding of resource requirements

4.10 Lack of delegation of responsibility, lack of accountability

4.11 Inappropriate use of information personnel

Please rank the above in order of importance

Problems related to the subject concerned are listed below. Are there any omissions?

A 5 Maintenance of Equipment

5.1 No allocations for equipment maintenance

5.2 Difficulty in securing consumable for equipment

5.3 No equipment maintenance contracts

5.4 Spare parts/documentation not available locally

5.5 Unable to repair in the event of breakdown

5.6 No local support to maintain equipment

5.7 Local firms do not honour service agreements

5.8 Lack of air conditioning for some equipment

5.9 Lack of understanding of maintenance standards

5.10 Maintenance manuals (inappropriate or inexistant)

Please rank the above in order of importance

Problems related to the subject concerned are listed below. Are there any omissions?

A 6 Stability of Parent Organization

6.1 Insecure funding sources

6.2 Dependence on foreign funding

6.3 Dependence on funding of projects vs core support

6.4 Not in good books of government

6.5 Mismanagement

6.6 Inappropriate mandate/mission of parent organization

Please rank the above in order of importance.

Problems related to the subject concerned are listed below. Are there any omissions?

A 7 Office Facilities

7.1 Cramped accommodation

7.2 Restricted office facilities (furniture, shelving, etc.)

7.3 No photocopying machine

7.4 Poor environmental conditions

7.5 Restricted use of stationery

7.6 Poor telephone communication

7.7 Restricted access to telex, telephone and telefax equipment

7.8 Inappropriate physical location of office

7.9 Poor electrical supply

7.10 Lack of communications facilities/equipment (telephone, telefax and telex)

Please rank the above in order of importance.

Problems related to the subject concerned are listed below. Are there any omissions?

A 8 Bureaucratic Procedures

8.1 Cumbersome procedure to get things done

8.2 Time wasting normal routines

8.3 Inflexible attitudes

8.4 Feudalistic practices

8.5 Lack of established systematic procedures

8.6 Inflexible systems

Please rank the above in order of importance.

Problems related to the subject concerned are listed below. Are there any omissions?

A 9 **Sharing of Resources**

9.1 Technical constraints

9.2 Informal arrangements

9.3 Institutional rivalry

9.4 Inability to co-operate at institutional level

9.5 Inability to resolve problems

9.6 Lack of practicality in formulation of schemes

9.7 Unable to participate in co-operative schemes due to heavy workloads

9.8 Personal attitudes at various levels that affect implementation of schemes

9.9 No follow-up on decisions on sharing of resource

Please rank the above in order of importance

Problems related to the subject concerned are listed below. Are there any omissions?

A 10 Access to Publications (printed and non printed)

10.1 Increasing cost of publications

10.2 Increasing cost of inter-library loan requests

10.3 Currency fluctuations

10.4 Foreign exchange restrictions

10.5 Poor currency exchange rates

10.6 Slow and irregular receipt of publications

10.7 Language barriers

10.8 Lack of knowledge of what is published

10.9 Lack of awareness of availability of gratis publications

10.10 Local booktrade not well developed

10.11 Lack of local resource inventories

Please rank the above in order of importance

Problems related to the subject concerned are listed below. Are there any omissions?

A 11 User attitude and temperament

11.1 Lack of awareness of importance of information function

11.2 Dissatisfied with services offered

11.3 Suggest improvements but do not help in securing support

11.4 Feel suggestions made may be disregarded

11.5 Afraid to make suggestions

11.6 Indifferent

11.7 Use alternative information services

11.8 Decisions made despite non-availability of appropriate information

11.9 Unaware of what it takes to process information that they require

11.10 Lack of user education programmes

11.11 Inability to recognize/articulate/express information needs

11.12 Lack of awareness

Please rank the above in order of importance.

Problems related to the subject concerned are listed below. Are there any omissions?

A 12 Planning and Management of Information Systems

12.1 Lack of appropriate planning of information systems

12.2 No set mandate/objectives

12.3 Inability to carry out the planning process

12.4 Inability to implement a planned programme

12.5 Lack of monitoring mechanisms

12.6 No evaluative studies undertaken

12.7 Lack of knowledge/skills in planning

Please rank the above in order of importance.

Problems related to the subject concerned are listed below. Are there any omissions?

A 13 Marketing and Promotion of Services

13.1 No promotion of services

13.2 Limited promotion of services

13.3 No efforts to market services

13.4 No resources in the promotion and market up of services

13.5 Lack of market knowledge/user needs

Please rank the above in order of importance.

Problems related to the subject concerned are listed below. Are there any omissions?

A 14 Interaction with users

14.1 Very little dialogue with users

14.2 Vague ideas of user needs

14.3 Inadequate knowledge of user community

14.4 Information staff not proactive

14.5 Lack of subject scope/expertise

Please rank the above in order of importance.

Problems related to the subject concerned are listed below. Are there any omissions?

A 15 Human Resource Development

15.1 Unavailability of continuing education programmes

15.2 No career development schemes

15.3 No development of self-reliant attitudes

15.4 No development of appropriate supervisory and management skills

15.5 No development of analytical skills

15.6 Inadequately trained staff

15.7 Lack of technical competence

Please rank the above in order of importance.

Problems related to the subject concerned are listed below. Are there any omissions?

A 16 National Infrastructure

16.1 Poor communications

16.2 No research activity

16.3 Insufficient manpower development

16.4 Underdeveloped book trade

16.5 Low use of technology

16.6 Poor national planning (institutional)

Please rank the above in order of importance.

Problems related to the subject concerned are listed below. Are there any omissions?

A 17 National Information Planning

17.1 No national information policy

17.2 No central agency that is involved in coordinating information planning

17.3 Ad hoc planning efforts

17.4 Lack of co-operation among parties concerned to effect National information planning

Please rank the above in order of importance.

Problems related to the subject concerned are listed below. Are there any omissions?

A 18 Professional Attitudes

18.1 Inability to transform data to information

18.2 Maintain traditional attitudes in the provision of information services

18.3 Inability to comprehend/adapt to changing user needs

18.4 Persist in the provision of supply oriented information services

18.5 Have a limited concept of "Information"

18.6 Unable to or do not extend beyond the conduct of activities for which they were trained

18.7 Reluctance to experiment with new things of adapt to change

Please rank the above in order of importance.

Listed below are the criteria thought to be necessary for information systems to attain sustainability. Are there any significant omissions from the list?

B **Criteria for Sustainability**

1. Support from parent organization **1**
2. Good management practice **3**
3. Knowledge of users and information uses **2**
4. Appropriate use of technology
5. Promotion and marketing of services **4**
6. Enhancing the value of information
7. Optimum use of local resources **5**
8. Enhancement of self
9. Generation of income **6**
10. Human Resource Development **7**
11. Minimizing use of foreign exchange

Please rank the above in order of importance

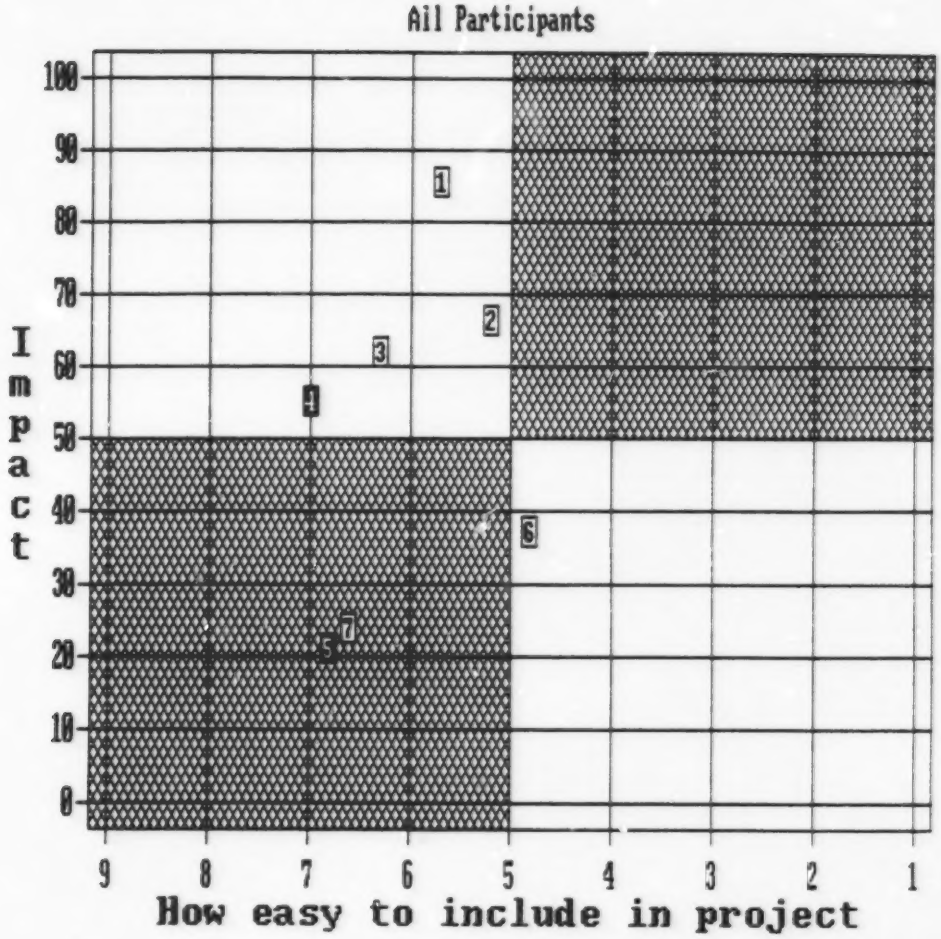
Axis of analysis: Y, impact on sustainability

X, how easy is it to include in project

All Participants

e Description	Y Axis(Rank)	X Axis(Rank)	Consensus Y	Consensus X	Q
-1. Support from parent rganization	85.6 (1)	5.7 (5)	Y	N	1
-2. Good management practice	66.1 (2)	5.2 (6)	Y	N	1
-3. Knowledge of users and nformation uses	61.8 (3)	6.3 (4)	N	N	1
-5. Promotion and marketing o ervices	54.9 (4)	7.0 (1)	Y	Y	1
-7 Optimum use of local resou	20.9 (7)	6.8 (2)	Y	Y	3
-9 Generation of income	37.1 (5)	4.8 (7)	N	N	4
-10 Human resource developmen	23.8 (6)	6.6 (3)	N	N	3

CONSENSUS MAP



-1. Support from parent
rganization
-2. Good management practice
-3. Knowledge of users and
nformation uses
-5. Promotion and marketing of
ervices

-7 Optimum use of local resources
-9 Generation of income
-10 Human resource development

Issue Segregation Summary

All Participants

Q1:	1-B-1. Support from parent organization 2-B-2. Good management practice 3-B-3. Knowledge of users and information uses 4-B-5. Promotion and marketing of services
Q3:	5-B-7 Optimum use of local resources 7-B-10 Human resource development
Q4:	6-B-9 Generation of income

This criterion has been further expanded with the identification of sub-criteria. Are there any omissions?

B 1. Support from Parent Organization

1.1. Adequate financial allocation
1.2 Adequate staff provision
1.3 Provision of equipment
1.4 Provision of office space
1.5 Have a mandate in the field or give information system mandate for information services in the field
1.6 Commitment on the need for information sciences
1.7 Recognize importance and value of information
1.8 Place information systems higher up in the organisational structure
1.9 Include information systems staff in the planning process

Please rank the above in order of importance.

This criterion has been further expanded with the identification of sub-criteria. Are there any omissions?

B 2. Good Management Practice

2.1 Define objectives
2.2 Efficient governance patterns
2.3 Effective organizational structures
2.4 Inculcation of team spirit
2.5 Cost-effective operations
2.6 Maintaining flexibility
2.7 Evaluating performance
2.8 Enhance quality of supervision at all levels
2.9 Give reign to good ideas
2.10 Allow staff to develop their own ways to achieve ultimate objective
2.11 Good communication practice between management and staff
2.12 Participative management style

Please rank the above in order of importance.

This criterion has been further expanded with the identification of sub-criteria. Are there any omissions?

B 4. Appropriate Use of Technology

4.1 Use of appropriate hardware/software

4.2 Use of technology available locally

4.3 Awareness of technological advance, trends and costs

4.4 Effective use of appropriate communication technologies

4.5 Plan adequately for the effective use of technology

4.6 Provide necessary training for maximum use of technology

Please rank the above in order of importance.

This criterion has been further expanded with the identification of sub-criteria. Are there any omissions?

B 5. Promotion and Marketing of Services

5.1 Market research
5.2 Planning the products and services
5.3 Planning the promotional package
5.4 Determining the market plan
5.5 Implementing the market plan
5.6 Feedback and evaluation
5.7 Maintaining visibility of the information system
5.8 Product development
5.9 Establishing a pricing policy
5.10 Developing value-added products

Please rank the above in order of importance.

This criterion has been further expanded with the identification of sub-criteria. Are there any omissions?

B 6. Promoting the concept of the instrinsic value of information

6.1 Personal conviction on the value of information
6.2 Understanding the broad spectrum of information
6.3 Getting to know how information is used locally
6.4 Establish appropriate measures to value information
6.5 Bring home the value of information to management
6.6 Educate the users on the value of information
6.7 Provision of repackaged information services suited to user needs
6.8 Work with users and in the process demonstrate the value of information
6.9 Charge something for every information product

Please rank the above in order of importance.

This criterion has been further expanded with the identification of sub-criteria. Are there any omissions?

B 7. Optimum Use of Local Resources

7.1 Establishment of co-operative schemes, both formal and informal

7.2 Implementation of resource sharing programmes

7.3 Developing a local information resource base

7.4 Enhance voluntary cooperation

7.5 Maintain directories of local expertise available

7.6 Need for regular meetings with appropriate persons at the local/national level

Please rank the above in order of importance.

This criterion has been further expanded with the identification of sub-criteria. Are there any omissions?

B 8. <u>Enhancement of self</u>

8.1 Reinforcing self-reliant attitudes

8.2 Providing local leadership

8.3 Maximum utilization of local resources

8.4 Self-development in the context of community development

8.5 Motivating factors put in place by National organizations

8.6 Develop other areas of competence

8.7 Quality of service

Please rank the above in order of importance.

This criterion has been further expanded with the identification of sub-criteria. Are there any omissions?

B 9. Generation of Income

9.1 Establish policies for income generation and distribution
9.2 Establish pricing policies
9.3 Establish and follow accounting procedures
9.4 Evaluate charging policy based on user response
9.5 Negociating the allocation of generated income
9.6 Identify and pursue alternative sources of funding

Please rank the above in order of importance.

This criterion has been further expanded with the identification of sub-criteria. Are there any omissions?

B 10 Human Resource Development

10.1 Availability of continuing education programmes

10.2 Career development schemes

10.3 Development of self-reliant attitudes

10.4 Development of appropriate supervisory and management skills

10.5 Development of analytical skills

10.6 Adequately trained staff

10.7 Acquire technical competence

Please rank the above in order of importance.

This criterion has been further expanded with the identification of sub-criteria. Are there any omissions?

B 11 Minimizing the use of foreign exchange

11.1 Greater use of local resources

11.2 Use of exchange schemes to acquire information

11.3 Acquisition of free publications

11.4 Use of gratis services

11.5 Purchasing only what is necessary

Please rank the above in order of importance.

The following have been identified as useful methods used by information systems in developing countries to attain sustainability. Are there any omissions?

C. Useful Methods for Sustenance

1. Use of voluntary service
2. Use of grants from funding agencies
3. Providing constant justification to management
4. Acquiring testimonials from clients for support from management
5. Establishing goodwill
6. Provision of satisfactory services
7. Provision of current awareness services
8. Expand information related assignments
9. Cutting costs by enhancing efficiency
10. Standardization of procedures
11. Seek user support to convince management of continued support
12. The use of a user committee as a means to achieve goals
13. Participate in user events
14. Using technology to provide efficient services
15. Efficien. utilization of funds
16. Determine user needs and try to meet them
17. Exploit existing organizational dissemination channels
18. Generate income by selling related tools (eg software)
19. Market & promote products and services

Please rank the above in order of importance.

It is believed that there must be some "pre-conditions" which must be met if an information centre in a developing country is to attain sustainability. Listed below are some. Are there any omissions?

D. Pre-Conditions for Sustainability

1. Stable governments
2. Stable institutions 4
3. Adoption of enabling policies
4. Support and co-operation, national and international 6
5. Adequate staff 5
6. Good communication systems
7. Management awareness of importance of information 3
8. Client support
9. Good financial support 1
10. Access to financial resources
11. Provide service to sectors willing to pay
12. Tailor information to expressed need 7
13. Promotion of services and their value
14. Sound marketing of information services 2
15. Evolving of systems to suit the situation they are placed in
16. Clear mandate 4
17. Sufficient number of users
18. Provision of service to identifiable clientele

Please rank in order of importance.

The following have been identified as failed approaches in attaining sustainability or factors that may pave the way to the attainment of sustainability.

E. Failed Approaches to Sustainability

1. Formal co-ordination at the national level - University of Botswana
2. Dependency on foreign data bases - Tanzanian Centre for Science & Technology, Dar es Salaam.

Do you have any additions to make?

CRITERIA FOR SUSTAINABILITY

The criteria for sustainability listed below are factors related to the management and operation of an information system thought to be necessary for the attainment of sustainability.

1. Support from parent organisation
2. Knowledge of users and information use
3. Good management practice
4. Promotion and marketing of services
5. Optimum use of local resources
6. Generation income
7. Human resource development
8. Appropriate use of information technology
9. Enhancing the value of information
10. Enhancement of self
11. Minimum use of foreign exchange

PRE-CONDITIONS FOR SUSTAINABILITY

The pre-conditions for sustainability listed below are environmental factors and broad policy options which would be positive influences on the attainment of sustainability.

1. Good Financial Support
2. Marketing of Information Services
3. Management awareness of the importance of information
4. Stable institutions
5. Clear Mandate
6. Adequate staff
7. Support and cooperation from national and international sources
8. Tailor information to expressed needs
9. Good communication systems
10. Client support
11. Access to financial resources
12. Provide service to sectors willing to pay
13. Adoption of enabling policies
14. Promotion of services and their value
15. Evolving of systems to suit the situation they are placed in
16. Sufficient number of users
17. Provision of service to identifiable clientele
18. Stable governments